THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. V. Nº 96—7th YEAR.] LONDON, JUNE 24, 1856. [Subscription per Ann. 15s. in Advance 18s. Credit. Price 8d. Unstamped.

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Further particulars may be known at the Company's offices; and applications (in applicant's handwriting), accompanied by testimonials as to character and efficiency, and stating amount of salary required, to be addressed to the SECRETARY of the Company.

JOHN H. COX, Secretary.

61, Fawcett Street, Sunderland, June 17, 1856.

TO MANUFACTURING CHEMISTS.

THE Committee of Directors of the LEEDS GASLIGHT COMPANY is ready to receive TENDERS for the COAL TAR and AMMONIACAL LIQUOR produced at their works, but do not bind themselves to accept the highest Tender.

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(By order) W. C. RAPER, Manager.

Gaslight Office, 18, Boar Lane, June 14, 1856.

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RICHARD FRYER, Secretary.

Brecon, June 18, 1856.

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NOTICE is hereby given, that the ANNUAL GENERAL MEETING of the Proprietors will be held on WEDNESDAY, the 2nd day of July next, at the hour of Two o'Clock precisely, at the Office of the Company, No. 3, Moorgate Street, London, pursuant to the provisions of the Deed of Settlement.

Two directors (Frederick Sims and William Stephen Dew, Esqs.) and one auditor (John Moxon, Esq.) retire by rotation; but, being eligible, will be proposed for re-election.

The accounts to be submitted to the proprietors will be open for inspection during ten days preceding the meeting.

(By order of the board)

H. M'L. BACKLER, Secretary.

London, June 13, 1856.

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MURRAY, COUTTS, and Co. are AGENTS for the Manufacturers of all descriptions of Cast-Iron Gas and Water Socket-Pipes, Retorts, Columns, Orders, Rain-Water Guttering, and General Castings, Railway Chairs, Bolts, &c.

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Manufacturers of LOWE'S PATENT MOTIVE-POWER METER, for situations where there is an inadequacy of pressure to supply the special requirements of certain consumers in low grounds during the day or night.

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THE Annual Dinner of the Members and their Friends will be held at the PLOUGH TAVERN, on MONDAY, July 7—Dr. BACHHOFFNER in the Chair—Mr. D. KITCHEN in the Vice-Chair. Tickets, including Dinner and Dessert, 5s. Dinner at four for five o'clock precisely. Tickets may be obtained at the bar of the Plough Tavern; at the George and Blue Boar, High Holborn; and of the Secretary, E. A. HUTTLY, 30, George Street, EUSTON SQUARE.

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The coals and cobbles are to be separately delivered where and as from time to time directed (in the proportion of three-fourths of the former and one-fourth of the latter), by and at the expense of the contractors; if by canal, then on to the gas company's wharfs at Nottingham and Radford respectively; and if by railway, then upon the railway company's station at Nottingham, and on the gas company's sidings at Radford and Basford respectively; and at and after the rate of one-fifth part of such total quantity in each calendar month, commencing with the month of August next, till the company shall be satisfied with the amount of accumulated stock, and afterwards at such rate as shall be from time to time directed.

The company will undertake to receive from each person or firm whose tender may be accepted, a total quantity of 5000 tons at the least; but they do not bind themselves to accept the lowest or other tender or tenders, till after a satisfactory trial of the coals and cobbles to which such tender or tenders may relate shall have been made. The coals and cobbles are to be the best of their kind, and as free as possible from sulphur, bats, bind, and dirt; and if delivered by canal, shall be conveyed in dry boats, and be gauged (21 cwt. to the ton) at the coal master's weighing-house at Lenton Lock; but if delivered by railway, shall be weighed (20 cwt. to the ton) upon the railway company's machine (or upon such other machine as may be mutually agreed upon), after being transferred into carts.

Payment for the quantity of coals received will be made monthly, if and so long as the contract shall be duly fulfilled, to the extent of four-fifths of the value of the coals delivered, and the balance on the satisfactory completion of the contract.

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By order of the committee,

T. HAWKSLEY, engineer to the company.

Nottingham Gas Office, June 13, 1856.

JOURNAL OF GAS LIGHTING NEWSPAPER PENNY

LIVESEY FIRE-CLAY WORKS,

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Manufactured only by WM. COWAN, 60, Buccleugh Street, EDINBURGH.

VOL. IV. of the JOURNAL of GAS LIGHTING for 1855, is now ready for delivery, price 15s., bound in cloth and lettered. Cloth backs for binding, 2s. 6d. each. A few copies of Vols. II. and III. are also still on sale.

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Have reduced the Price of their

PATENT ENAMELLED CLOSET PANS,

WITH TRAPS, to

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These Pans, therefore, which have a strong Vitrified Body, as well as a White Interior Glaze, may now be obtained at the price of the commonest description of Closet Pans.

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Beg to inform Builders, Contractors, and others, that they have made a considerable REDUCTION in the PRICES of their

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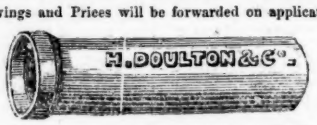
Drawings and Prices will be forwarded on application.



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OFFICES: HIGH STREET, LAMBETH, LONDON.

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NOTICES.

The next number will be published on Tuesday, July 8, and the subsequent numbers on each successive alternate Tuesday, till our project of weekly publication is carried into effect.

Stamped copies, when forwarded by post, must be folded so as to expose the stamp; they are otherwise liable to the full postage charge for letters.

This JOURNAL has been duly registered at the General Post Office for transmission abroad.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 24, 1856.

NOTES ON PASSING EVENTS.

THE bill for the amendment of the Public Health Act "drags its slow length along," and has been so often deferred that there is reason to believe either that Ministers intend to shelve it for the session, or that they hope to be able to trick the Legislature into passing the measure without examination. Sincerely do we hope that the former supposition may be the correct one, and that a real investigation into the principles upon which the original act was founded, and into the manner in which it has been applied, may take place, before the nation is permanently burthened by an organisation we believe to be both useless and expensive. There can be no doubt but that the extraordinary change which has of late years come o'er the spirit of our society, and has led to the sudden reversal of the proportions which formerly prevailed between the rural and the urban populations of our realms, had given rise to many fearful evils, and to suffering unutterable on part of large classes of our fellow-citizens. The sanitary police of our towns had, unquestionably, proved unequal to contend with the requirements of a social organisation essentially different from that which had prevailed when it was originally founded; and, alas! in far too many cases, private charity had been proved to be powerless to remove the evils under which the manufacturing populations were suffering—even to death. We had been an agricultural, even more than a commercial, nation before the peace of 1815; but the last forty years' peace have changed greatly the relative occupations of our population; and now the bulk of our fellow-citizens are crowded into towns, instead of dwelling face to face with nature. This change came upon us suddenly; no one foresaw its effects, nor were any attempts made to assuage the evils to which it necessarily gave rise; until, at length, the condition of the labouring classes became, in some important matters, so fearful that even *our* rulers were forced to listen to the cries of distress to which it gave rise. Unfortunately, the Governments of the days when the question assumed this magnitude were under the influence of men who, however sincere they might have been in their desire to advance the public good, were at the same time bigoted to certain social, and even technical, theories, as well as careless with respect to the means they employed. The mode adopted to collect the information necessary to guide our legislators was likewise of the worst, because most one-sided, description; and it so happened, by a strange coincidence, that the return of the cholera in 1848 and 49 added to the influence of the mistaken enthusiasts who had procured the adoption of the Public Health Act of 1848. That measure, indeed, appeared to be so well justified by the scourge which followed upon its heels, that if the parties who were entrusted with its administration had been possessed of only a moderate share of honesty (see Sir B. Hall's attacks on the Board of Health in 1854) or of tact, they would have been allowed to have retained the power and influence given by the act. Something of the kind *was* wanted; some facilities were required for the removal of the evils of all large agglomerations of men. But Mr. Chadwick, who soon became the Alpha and the Omega of the sanitary movement, lost himself and his cause by a silly attack upon all scientific or practical men who would not adopt his wild theories of telescopic sewers, soft water, pot-piped gathering-grounds, hose and jet, and sewerage manure distribution. Right or wrong theoretically, he was wrong practically in attempting to force the application of doctrines hitherto unverified by practical experience, and in compelling the towns which came under his influence to employ his own willing tools. Under such a guidance, it was inevitable that failures should arise, and that bitter feelings should be excited. Mr. Chadwick's nominees *did* fail in almost every case they undertook; injudiciously applied, all his doctrines upon engineering subjects have proved sources of loss and bitter disappointment; until at length, in 1854, even the partisans of the new school of philanthropists were compelled to admit that it was likely to produce evils greater than those it was desired to remedy. At that period Sir B. Hall was the most bitter opponent of Mr. Chadwick and his measures; but directly the House of Commons had set aside the last-named gentleman, and Sir Benjamin had been named to his vacant place, the spirit of circumlocution and of red tape came over him; and, so far from reforming the abuses of his predecessor, the radical opponent of bishops and of centralization, became an energetic supporter of "things as they then were" under his control. During the whole of this intermediate period between 1848 and 1855, incessant attacks were also being made against the private companies which had undertaken to supply any of the objects included within the attributions of the municipalities created by the Public Health Act; and, as the whole of the power and influence of the Central Government has been brought to bear against them, a serious interference has taken place with the development of the spirit of private enterprise, to which we, as a nation, formerly looked for the supply of acknowledged wants. Faith in former institutions has thus been shaken, but no new system has been erected in their stead. Society has been taught to consider companies as organised bands of robbers, and to believe that its only safety lies in substituting itself for them; but, at the same time, most of the attempts to apply these Socialist doctrines have resulted in failure; and therefore it is that we believe that all honest men ought to unite in calling for an inquiry into the actual results obtained by the General Board of Health, before that expensive machinery is irretrievably fastened upon the country.

Most emphatically do we repeat, that the investigation before the select committee upon the Public Health Bill of 1855 was a farce, and that in every possible manner evidence unfavourable to the views of the existing authorities was suppressed or tampered with. The admitted defects of our present social organisation in sanitary matters, again and again, we repeat, call for the fullest and fairest examination. Let the present Legislature decide this question as it may, such an investigation must ultimately take place for the sake of society; the sooner it does take place the better it will be; and therefore it is that we once more repeat our earnest hope that, insomuch as there would be serious inconvenience in abruptly putting an end to the Board of Health, a short continuance bill may be passed for this session, and that a fair enquiry into the whole subject may take place early next year. In the measure now before the Legislature, clauses 40 and 45 seem to be those which in-

spire the most apprehension amongst gas and water companies; and if the bill should not be withdrawn, we would urge our friends to petition against them in as great numbers as possible.

Just at this critical moment for the existence of the General Board of Health, it has resorted to the usual tactics of the demagogues who strive to guide the whirlwind of popular prejudice, by another of its attacks upon the water companies. What good end can be accomplished in 1856 by discussing the effects produced in 1854 by a source of water supply abandoned in 1855, we cannot at once perceive. Nobody ever questioned that bad water did not produce serious and fatal effects upon the populations compelled to consume it; and the Southwark Company, especially, has made great efforts to improve the quality of its supply. Even Mr. Simon himself admits this; but he endeavours to disguise the covert attack upon one of the "monopolist companies" by urging the incidental question of the importance of securing the rivers throughout the country from pollution. Oddly enough, there is nothing upon the face of the proposed bill to compel Local Boards of Health either to disinfect the sewerage waters they return to the streams, or to distribute them as sewerage manure. It is true that Mr. Simon says, "that the only escape from the sanitary dilemma (of the pollution of rivers) seems to lie in the organisation of means for the systematic agricultural employment of sewage:" but, if the evil be so great as he says, why does not the board created expressly to watch over the proceedings of local authorities compel them to avoid its diffusion? Without at all entering upon the discussion of the best application of sewerage manure—or sewage as it is incorrectly called—we question the correctness of Mr. Simon's reasoning when he says that the *only* escape from the evil lies in its distribution over agricultural lands. This may be the *best* escape, but certainly it is not the only one; and we protest against this unphilosophical mode of narrowing a general discussion to suit the views propounded by the head of the administration to which Mr. Simon belongs. The report lately issued upon the effect of impure water upon the diffusion of cholera, &c., indeed, appears to us to be exposed to the same accusation of "special pleading" and *ad captandum* appeals to prejudice which may be addressed to all the publications of the General Board of Health. There is, no doubt, some truth in its statements of the relative mortalities in the districts of south London; yet there is in it nothing to call for their publication at the precise moment, and still less to justify the assertions in favour of a system of distribution of sewerage manure over agricultural land, to the exclusion of systems of disinfection.

The Metropolitan Board of Works appears to us to be disposed to enter upon a course which will do much to raise it in public estimation, and to furnish a good contrast to the proceedings of the irresponsible government authorities. We allude to the discussions which have lately taken place with respect to the embankment of the northern shore of the Thames in connection with the formation of the low-level intercepting sewer—a project of far greater general interest than the formation even of new parks at Hampstead, Finsbury, or Bermondsey. In a subsequent part of this JOURNAL, we have ventured to call attention to some of the considerations attached to this national undertaking, and propose to revert to it on a future occasion. In the meantime, we would observe that it is important that the members of the Metropolitan Board should not overlook the enormous amount of private property inevitably affected by any change in the conditions of the tidal portions of the Thames, and that they should calculate either upon a strenuous opposition from the holders of wharfage property, or upon being compelled to purchase their rights at a cost it would be difficult to estimate. No great good has been, however, effected at any time without giving rise to opposition and difficulties. The embankment of the Thames can form no exception to this law; it is therefore important that whatever difficulties may surround this subject, they should be fairly, and at the outset, grappled with.

Sir B. Hall has presented a second bill for the amendment of the Local Management Act at so late a period in the session as to render a fair discussion either of its merits, or of the defects admitted to exist in the original measure, being discussed in the manner they deserve. Upon its face, the new bill appears only to deal with the difficulties which have arisen with respect to the election of the guardians of the poor; but it would require a more careful examination than we have been able to give it to justify us in expressing any opinion as to its real tendency; for the new and artificial meanings affixed to ordinary words have, of late years, rendered it necessary to read almost every antecedent statute upon the subjects connected with a new bill before the latter can be understood. There is, however, no attempt made by Sir B. Hall to remedy the defective borrowing powers of the original Metropolis Management Bill, nor even to put an end to the uncertainty with respect to the powers of the new board to execute the works of public improvement, such as the formation of parks or places of recreation, for which Sir B. Hall is himself so clamorous. In the meantime, it is to be hoped that the parishes will carefully examine the bill, for they appear to be the parties most likely to be affected by it.

Deeply commiserating as we do with the sufferings of our neighbours, and now dear allies, from the fearful inundations which have ravaged the fairest parts of France, we may congratulate ourselves upon the exemption of our own country from the periodical recurrence of so fearful a scourge. Hitherto no attempt has been made to explain the unexampled severity of the visitation; but it appears to us that it must have been to some extent affected by the recent operations for embanking the principal rivers, which certainly have not been effected in such wise as to allow the passage of the immense bodies of water furnished by the melting of the snows under the influence of the warm rains, or of the hot winds, from the south and south-east. It is curious that, although the rivers flowing towards the north have been swollen to a great height, they have not produced such fatal consequences as those which flow towards the west and the south, as though the determining cause had acted more powerfully in the latter direction. Both in a social and a scientific point of view, these inundations merit serious examination. Surely engineering skill ought to be able to mitigate, if it cannot prevent, the recurrence of such fearful misfortunes; and equally does it appear to us that the elaborate system of public works in France has proved itself unable to guard against an event which ought to have been foreseen.

ON THE PLANS FOR THE SEWERAGE INTERCEPTION OF THE METROPOLIS.

[SECOND NOTICE.]

THE scheme for the sewerage interception upon the northern side of the Thames, presented lately by Mr. Bazalgette, is substantially founded upon the same principles as the project he had submitted in January, 1854, to the late Metropolitan Commission of Sewers, in conjunction with Mr. Haywood. A great deal of acrimonious criticism has been bestowed upon the original project, which Mr. Bazalgette has very wisely attended to before the presentation of his new design; but it is worthy of particular remark, that the only modifications which have been introduced are connected with minor details, of so little importance, indeed, that even if the scheme now before the Board of Works be approved, the engineer may find it necessary to alter it during the execution to nearly a similar extent. It would be impossible to cite a more striking illustration of the mischief produced by governmental interference in these matters; for the result of Lord Palmerston's conduct towards the late commission appears thus to have been simply to have delayed, for two years, the commencement of the works, admitted by all parties to be essentially necessary for the comfort and salubrity of the metropolis. Another lesson may also be derived from these facts and discussions—viz., that with respect to the upper and middle level intercepting sewers, no real difference of opinion prevails amongst those most competent to judge; and it seems to us, as it evidently does to the board, that whatever doubts may exist with respect to Mr. Bazalgette's entire scheme, they are connected entirely with the low-level sewer, and the manner of treating the western district. The consideration of the former is connected with a question of extraordinary magnitude; and, without in any manner assuming to influence the decision of the Metropolitan Board of Works, we have ventured to call attention to its nature, and some of its possible effects, which do not appear hitherto to have been stated with sufficient clearness to enable the public at large to understand all their bearings, although the various members of the board themselves evidently require little information from our hands. Moreover, the consideration of the manner in which the sewerage of the western district is to be treated still seems involved in doubt; nor, in the present state of our scientific knowledge of the best means of disposing of

sewerage refuse, can this afford reason for surprise. We have deemed it our duty to add a few remarks upon this portion of the subject, inspired by a recent personal, though cursory, visit to the irrigated lands at Rugby, already referred to in this JOURNAL.

At page 13 of Mr. Bazalgette's report on the northern drainage scheme, he quotes a passage from the communication made by himself and Mr. Haywood to one of the last Commissions of Sewers, in which he had alluded to the advantages to be derived from combining the execution of the low-level sewer with the execution of an embankment of the broad shore of the concave bank of the Thames now left bare at low tide. In the next page, he also alludes to the various circumstances connected with the existing state of the sewers of the district between the Westminster and London bridges, which would almost render it imperative to construct the new artery in that position. It appears, from all that we can learn, that the prevailing feeling of the board is in favour of a general measure of this kind, and that at least the propriety of embanking the river will be carefully investigated. This would, indeed, be a noble reply to the disappointed critics of the board; and in this manner it would connect itself with one of the boldest and most important improvements of the metropolis attempted of late years. There are, however, other interests to be considerd, other engineering difficulties involved, than those connected either with the property upon the banks of the river, or with the execution of the low-level intercepting sewer, and the connection with it of the existing branch sewers; because, in dealing with any one of the physical conditions of a large body of running water, the modifications introduced are extremely likely to affect all the other conditions of its *régime*.

Since the demolition of the old London Bridge, for instance, there has been a marked change in the form of the bed of the Thames, and in the quantity of water flowing in with the tide, as well as an alteration of the materials forming the bed of the river, which may perhaps, to some extent, be affected by the action of the countless steam-boats plying upon its surface. The removal of the starlings around the piers of the old bridge, and the diminution in the number of the piers themselves, by increasing the water way, allowed a much greater quantity of water to flow into the upper portion of the Thames than had been able formerly to pass the bridge. Naturally, this increased flow of the tide produced an increased scour upon the ebb, and, after a few years, the bed was lowered to such an extent that both the Westminster Bridge, built upon caissons, under Labelye's directions, and Blackfriars Bridge, constructed under those of R. Mylne, were seriously endangered. Works were undertaken for their consolidation, and a considerable outlay thus incurred; but, unfortunately, no attention appears to have been paid, in their execution, to the lessons of experience, nor was any attempt made to protect those structures from an eventual repetition of the same destructive action. However, it appears that, about the year 1842, the various conditions of the river had assumed their normal balance, so to speak, and for a time no further change took place. Subsequently, the works for embanking parts of the lower Thames. and for the formation of the numerous half-tide wharfs in the upper parts, by concentrating and directing the scouring effects of the tides, caused the abrasion of the bed to be resumed, and again the foundations of the old bridges were attacked in so serious a manner as almost to render imperative their demolition; whilst it is to be suspected that not only are the foundations of all the other bridges on the river affected, but also that considerable changes must have taken place in the alluvial deposits near the mouth, or in the salt-water parts, of the river. Hitherto the works for the embankment of the Thames have not been carried into effect upon a broad, comprehensive scale; yet the results they have produced have been of a very marked character, involving the security of the property within its reach, and the interests of the inland navigation.

Now, if the extensive fore-shore over which the tide wastes its action, between Westminster and London Bridges, be withdrawn from its influence by an embankment connected with the wall partially executed between Chelsea and Westminster Bridges, either the total quantity of water available for scouring the bed of the river must be diminished, or the tidal wave will be driven with greater, because more concentrated, force into the upper parts of the Thames. All past experience tends to induce the belief that the latter will most probably take place; but the effect of such an action would also be to lower the low-water line, and, at the same time, the bed of the river. In discussing any scheme for the diminution of the area of the lower part of the tidal surface of the Thames, it becomes essential, therefore, to take into account the probable effects that operation would produce upon the various buildings in or upon the banks of the river; and to allow, in the estimates for the cost of the works, a considerable sum for the contingent repairs it may render necessary. If the area to be subtracted from the tidal surface be considerable, however, we believe that it would be necessary, for the sake of the internal navigation, to allow the tidal wave to flow much further into the heart of the country than it now does; and for many reasons it must be suspected that such a course would even now be very desirable. Such an operation would increase the velocity, and, consequently, the scouring power of the ebb tide, and again places before us the necessity for considering the alterations it would make in the bed: besides this, it would affect many water privileges of the utmost importance, not only to individuals, but to the public itself.

It is far from being our intention, in making these remarks, to throw any difficulties in the way of the execution of an undertaking we believe to be almost indispensable for the efficient solution of the difficulties attached to the drainage of the low-level or Strand district; and which, we believe, would also be conducive to the best interests, commercial and sanatory, of all the inhabitants of the valley of the Thames. We are only anxious that the whole of the present, and of the eventual, bearings of the case should be duly weighed; that nothing should be begun in these matters without careful investigation; and perhaps, also, we might suggest, that the whole expense of a work affecting the entire valley of the Thames, and, may be, the national defences of all southern England, should not be thrown upon the inhabitants of the metropolis. At present it is to be feared that the infinite ramifications of the subjects involved in any general measures for the alteration of the course of our river have not been duly considered. Neither the parliamentary reports upon the Thames embankment, nor the reports to the Bridge House Committee, nor the schemes submitted to the Metropolitan Board, have discussed, in a broad philosophical manner, either the laws of the tidal action of the Thames, or the alterations to which they may be exposed by a change in the direction or of the area of the water way. There can be little reason to believe but that in every respect it would be desirable, in a sanatory point of view, to cover the broad surfaces of mud now exposed at every tide in the very heart of the metropolis; and that it would be equally desirable to avoid the interference with the business of the Strand, and the alterations of existing sewerage which would follow from the execution of Mr. Bazalgette's substantive sewer—if we may use that word to express the difference between it and the eventual project under the embankment. We are convinced that, even were the low-level sewer executed in the position indicated upon Mr. Bazalgette's plan, it would be attended with great difficulties, from the geological constitution of the ground through which it must be carried; and the experience obtained in the construction of the Victoria Street sewer ought to inspire caution in dealing with the treacherous strata of the London tertiaries. Even in this case, it would be necessary to allow a large margin in the estimate for contingent damage to property; and really it would seem that this source of expense might assume such proportions as to render the cost of the execution of the sewer upon the fore-shore only, in a trifling degree greater than that of its construction more inland. Whichever direction may be chosen, however, the Metropolitan Board must calculate upon having to pay heavy sums for compensation to the parties whose business will be interrupted by the new works; and it is therefore incumbent upon it to consider how these sums can be most beneficially employed for the permanent, rather than for the temporary, benefit of the ratepayers. Sooner or later, if our already overgrown Babylon continue to expand as it has done of late years, the construction of some broad throughfare parallel to the Strand must be undertaken; for the circulation upon that line is already so enormous, that the business relations between the east and west of London are seriously impeded. The value of property between the Strand and its continuations on the one side, and the river on the other, is so great that it would be madness to attempt any alteration or improvement of a general character amongst it. Forcedly, then, any new mode of direct communication between the extremities of the town must be designed with reference to the enclosure of the

northern banks of the Thames; and, as this *must* be so, the question may fairly be asked, why not at once deal with it, insomuch as the works necessary for the formation of the low-level intercepting sewer would materially assist the formation of the new road, and a considerable economy to both might thus be obtained?

The considerations we are anxious to impress upon the public are, however, those which have reference to the physical difficulties and the possible cost of this magnificent scheme. Again we assert that none of the reports, plans, or suggestions, it has been our lot to examine, have dealt fairly or philosophically with the natural laws involved in any alteration of a tidal river of the magnitude and peculiarly complicated nature of the Thames. It is easy enough to make drawings of artistic merit, like those of that extraordinary genius, John Martin, or of questionable taste, like those of Sir J. Paxton; but the bold operations now suggested require far deeper engineering knowledge, and a more comprehensive view of the laws of nature than has been hitherto brought to bear upon the subject; whilst even the economical results of the operation have been treated in an off-hand, slipshod way, which would be amusing if it were not for the uneasy conviction that we should have to pay our portion of the public burthens it might impose. Mr. Bazalgette has had great experience in hydraulic engineering, and unquestionably has also possessed extraordinary advantages for studying the physical conditions of the Thames; but the interests involved in this scheme of embankment are so enormous, that we are convinced that he himself would prefer to be supported by other advice, and that he would feel more satisfaction in co-operating with a properly selected commission of scientific men appointed to examine all the bearings of the case, than in assuming the responsibility of a work of such magnitude and national importance. As we said in the commencement of this article, the Metropolitan Board appear to us to have acted very wisely in separating the consideration of the high and middle level intercepting sewers from that of the low-level one; and, unquestionably, it is right in adopting the belief that he latter would be most advantageously executed in combination with the embankment of the northern shore. Our desire is only to place before it and the public some remarks upon the difficulties to be encountered, and to suggest that at the earliest possible opportunity a commission of properly qualified engineers, hydrographers, naval and commercial men, should be appointed to examine and report upon the most advisable course of proceeding. This is a subject to which we ourselves have paid considerable attention, and we are convinced that the proper course to be followed is the one to which evidently the Metropolitan Board now tends. But what will be its cost? How shall the new works be connected with existing ones; and how are they to modify our present commercial relations? The interests of the densest and wealthiest population in the world depend greatly on the solution of these questions; and they may well cause the board to act with caution.

Upon the subject of the disposal of the western sewerage we feel bound to state, that the recent visit we made to the fields to which Mr. Walker has applied the sewerage manure of Rugby, has materially altered our opinions with respect to the practical results that system is likely to produce. There is so marked a superiority in the appearance of the corn crops upon Mr. Walker's fields to those around them, and the number of cattle he feeds per acre is so greatly in excess of that fed upon neighbouring lands, that the abstract question of the success of sewerage irrigation is to our mind satisfactorily solved. But there still remains the economical question; and we fear that for many years to come town populations must calculate upon undertaking the outlay required for the works necessary for the collection, pumping, and perhaps for the distribution of the manure. Eventually farmers will, no doubt, be convinced of the value to them of this mode of irrigation, and it will make a complete revolution in all agricultural operations; for the present, however, no demand for the sewerage exists; and until it shall have been created, municipalities must be prepared to support the charge attending the inoffensive disposal of this kind of refuse. Time will solve the difficulties attached to this matter: the only course which can for the present be safely adopted is to reserve full and entire freedom of action, and to forget the absurd statements of those who represented, and still repeat, that the sale of the sewerage manure could be made a source of revenue. So far as the western sewerage is concerned, if we might be allowed to offer a suggestion, it would be simply that enough land should be taken at the proposed pumping station, near Parson's Green, to allow of the formation of an establishment for the purpose of forcing the sewerage to any point where it may be required, leaving the general nature and the details of the distribution to be settled by those who would be willing to receive it; or for the purpose of forming works for the disinfection of the sewerage, should no one be disposed to apply for it. In either case—that is to say, whether the sewerage be distributed in the liquid form, or whether it be poured in a disinfected state into the river—it appears to us that it would be desirable to secure a considerable portion of land near the pumping stations.

ON THE RECENT DISCUSSION IN THE SOCIETY OF ARTS UPON THE FIRES OF THE METROPOLIS.

When ought individual liberty to be interfered with so as to secure the enjoyment of the greatest amount of liberty by society in general? This is a question which is forcibly brought under our notice by the incessant attempts of a class of office-seekers—men who give themselves forth as being able to instruct the world in everything, but yet are practically ignorant of the questions upon which they presume to decide—to extend the interference of Government to every detail of life. It used to be our boast that we, as a nation, were pre-eminently capable of taking care of ourselves; and, with all our shortcomings, it is notorious that the result of our present municipal arrangements has been so far satisfactory that the average duration of life has been greater in England, notwithstanding its bad climate and many social evils, than in any other country in the world. Now, it would appear that we are suddenly awaking to the conviction that it would be preferable to entrust to the care of a few paid officials the discharge of the duties we had previously retained in our own hands, and that we should look to the Government for guidance and protection in the commonest details of domestic life. This change in the spirit of our dream manifests itself in the attempts on the part of the Central Government to interfere with the supply of gas and of water, and the execution of sewerage; to absorb to itself the management of the police; to issue regulations for the depths and sizes of graves; to protect us against the thousand and constantly varying forms of commercial fraud; to defend us from unpleasant smells; and to provide innocent amusements—and even to regulate the construction and dimensions of our household dwellings. Our predecessors for centuries wisely left the nation to look after all these things for itself, and we lived with tolerable ease and comfort; at present, our legislators seem disposed to imitate the paternal systems of the Continent, and, in their anxiety to prevent us from being killed, they are fast depriving us of the means of living.

Mr. Braidwood seems, we fear—and we regret it sincerely—from the tone of his observations at the meeting of the Society of Arts on May 7th last, to have laboured in his vocation, and, to the extent of his ability, to extend this intervention of Government in our domestic and business affairs; and on that occasion he called attention to the actual state of our municipal law, in so far as it affected building in the metropolis—a state which he claimed credit for originating, but which we believe to involve much useless and vexatious interference with the operations of trade. There is nothing extraordinary in the fact that a public officer should prefer to be considered as being in the employ of the whole body politic, rather than in that of a union of companies. Mr. Braidwood's desire to see a recognised "fire marshal" upon the list of officers of the Metropolitan Board of Works is, therefore, easily understood; and, indeed, for many reasons it may be considered that the creation of that, or of a similar, office would be advantageous to society in general. But it is extraordinary that the Legislature should have passed a measure affecting the construction of every building in this immense metropolis, upon the suggestion of a man such as Mr. Braidwood must be suspected to be from the remarks he made on the occasion alluded to above. No doubt Mr. Braidwood has had plenty of experience in putting out fires, and his recommendations upon that subject must at all times be worthy of consideration; but evidently, from his recorded opinions, he knows so little of the philosophy of building, that we must record our protest against the doctrines with respect to it he occasionally propounds, and against the law formed upon them he was instrumental in securing. Unfortunately, he represents in this matter a class of active intermeddlers who have, to use a vulgar phrase, "the

ear of the Government," and it is not to be expected that any good will be effected, so long as the present Ministry is in power, by pointing out the mistaken opinions of its advisers; but it is our duty, even against hope, to endeavour to counteract the effects of the confident assertions of the blind guides it is now the fashion to select,

To illustrate the description of slipshod reasoning we are condemned to listen to from official scientific authority, we may mention that Mr. Braidwood asserted that "the danger from furnaces or close fires, &c., is very great; and no flue should be permitted to be so used, unless it is prepared for the purpose;" the reason being that the heat may be so great in such flues as to render them a source of danger; and Mr. Braidwood alluded to an instance in which the temperature in a flue had been observed to mark 300° at a distances of 40 or 50 feet from the fire-place. Surely we do not require that "a second Daniel should come to judgment" to tell us that when a flue is overheated it is a source of danger! and every respectable tradesman who is employed to erect a furnace for heating, cooking, or manufacturing purposes, will take care that the flue shall be constructed so as to avoid danger from this cause. There is, however, nothing incorrect in the proposition thus made, or in the opinion upon which it is founded; it is a truism, and nothing more; but we demur distinctly to Mr. Braidwood's assertion, that "heating by hot air, steam, and hot water are objectionable," as well as to the reasons he relies upon for supporting it. His words are, "first" (this method of heating is objectionable), "because there must be a furnace and furnace-flue, and the flue used is generally that built for an open fire only; and, second, the pipes are carried in every direction, so as to be as much out of sight as possible. By this means they are constantly liable to produce spontaneous ignition; *for there appears to be some chemical action between heated iron and timber, by which fire is generated at a much lower temperatare than is necessary to ignite timber under ordinary circumstances.* No satisfactory explanation of this fact has been given; but there is abundant proof that such is the case." We flatly deny that it is a fact, however; and contend that it is absurd to talk of a chemical action taking place under the circumstances, and producing the results described in this startling enunciation. Timber which has been thoroughly dried is, of course, more easily inflamed than wet timber; but even when subjected to destructive distillation, the gases evolved from timber are not exposed to spontaneous ignition. But, apart from this very false philosophy, we would ask, what is there in the fact that the "pipes are carried in every direction so as to be as much out of sight as possible," which should cause spontaneous combustion? Mr. Braidwood meant, no doubt, that when the pipes are carried in such directions as to place them in contact with woodwork, there is danger to be apprehended; and so unquestionably there is, if the degree of heat be sufficient to dry the wood thoroughly, and then fire be applied, or if high-pressure steam be used, as it was formerly at times. But in a paper affecting to discuss scientific questions, this vague mode of expression ought not to be admitted, and the convenient verbal formula, "spontaneous ignition," ought to be reserved for occasions when it is really applicable; for our own parts, we are disposed to think that spontaneous ignition is of much rarer occurence than it is now the fashion to assert, and that the phrase is often used to disguise the ignorance of the parties whose duty it may be to discover the cause of a fire.

Mr. Braidwood's remarks about warming by hot water are of as little scientific value as those above noticed; because it is possible that the distributing-pipes should be hermetically sealed, and yet that the temperature of the water in the boiler should not be such as to cause any danger. Whatever distance the water may traverse in the pipes, the temperature in the boiler will eventually be regulated by the safety-valves, which are placed upon every properly constructed apparatus of this description; and that no danger of ignition exists so long as the pressure of steam in the generator does not exceed six atmospheres, must be proved by an examination of the felt and wood linings placed round the steam-pipes of the numerous factories in the kingdom where high-pressure steam is used. Besides, we would ask Mr. Braidwood when he ever saw a boiler fed from a cistern placed at more than 120 feet above the water line? Yet, in even this extreme case, the pressure would only be about 52·08 lbs. on the inch—say, in round numbers, 4 atmospheres; and the temperature of the water under such circumstances, cannot exceed 145·4° centigrade, or 293·72° Fahrenheit—a degree of heat which would certainly not raise the temperature of the distributing-pipes to a point which should render even their positive contact with wood a source of immediate danger. We have known instances, it is true, in which the communication with the cold-water cistern of an apparatus for heating by a circulation of water through small pipes has been shut off, and the water contained in the boiler and distributing-pipes heated to a very dangerous extent; but none but a madman would habitually expose himself and his neighbours to such a risk, and it is hard to legislate against such follies. The real precautions to be observed are, that the boiler should communicate freely with a cold-water tank, and be provided with safety-valves, so as to prevent the steam from acquiring an undue pressure. There is, no doubt, danger to be apprehended from the injudicious heating of buildings by hot water, or by steam under great pressures: but the danger arises more from the apparatus itself, and from its possible explosion, than from the possibility of its causing spontaneous ignition; and the remedy would rather consist in a supervision of the apparatus than in vexatious interference with the direction of the pipes. Are we prepared to create a body of inspectors of steam-engines and factories? That would be the only official solution of the difficulties and dangers Mr. Braidwood could really discover in the application of hot-air, water, and steam apparatus; and it is a solution which would be as opposed to the genius and feelings of our nation as it has been proved to be fatal to the progress of the countries where it has hitherto been applied.

The 21st clause of the Metropolitan Buildings' Act, 1855, which was evidently drawn up in accordance with Mr. Braidwood's opinions, provides, among other precautions, that "no pipe for conveying heated air or steam shall be fixed nearer than six inches to any combustible material; no pipe for conveying hot water shall be placed nearer than three inches to any combustible material; no pipe for conveying smoke, or other products of combustion, shall be fixed nearer than nine inches to any combustible material." If these provisions be rigorously enforced, it will, we fear, be found impossible to warm many buildings by either of the processes which have been practically shown to be, not only the best and most economical, but also the safest; because the distances prescribed will, in many cases, act as a prohibition to the application of the respective systems of warming. Perhaps there would be little objection to the last regulation we have quoted, if it were limited to the smoke pipes from furnaces; but it is evidently absurd to require that the pipe conveying the heated air and the products of combustion from a gas chandelier should be isolated, to the extent prescribed, from combustible materials. The act cannot indeed, by any possibility, be observed in modern houses—or at least all attempts at ventilation over a chandelier must be renounced, for it is impossible to carry "the pipe conveying those products of combustion" at a distance of not less than 9 inches from any combustible material, since the joists are hardly ever placed at greater intervals than 14 inches; even were it possible so to do, there would be no necessity for it in the case supposed, any more than there is for the distances prescribed in the preceding sections of the clause. The whole system, in fact, is based upon the supposed chemical action between the wood and the iron at certain temperatures; and, as we are convinced that the action does not exist, there does not appear to us to be any reason for the precautions intended to guard against it.

Mr. Braidwood said that there was danger to be apprehended from placing gas-pipes too near a ceiling; and so there may be, unquestionably. In the case he mentioned of a ceiling being set on fire by a gas-burner, although removed from it no less than 28½ inches, he forgot to mention whether or not it was an argand burner; for with a strong pressure on the main, and with a good glass funnel, the flame from one of these would probably be 24 inches long. No doubt there is danger in the injudicious use of gas, as there is in the injudicious use of water or of gunpowder; but the remedy for the evil thus apprehended must lie in improving the education of the parties entrusted with the application of the so-called dangerous elements—not in any official supervision, which can never extend to their endless applications in daily life. We require good conscientious tradesmen—not red-tape officials; and if the public would consider more the character of the men it employs than a trifling economy in the first outlay, we should hear far less of the accidents from the use of gas, or the execution of any system of warming by water, air, or steam.

The root of many of the evils of which the public complains lies, in fact, in this mania for economy, and in few cases has it produced such evil results as in the gas-fitters' trade. For instance, the introduction of the very bad and very dangerous composition pipe, instead of tin pipe, has done more to raise a prejudice against the use of gas internally than almost anything which can be named. The composition metal is very rapidly and unevenly destroyed by the gas, and this destructive action takes place in the most marked manner when brass junctions are used; escapes consequently take place, accompanied by all the inconveniences and annoyances to which they give rise. Again, the use of vulcanized caoutchouc tubes, instead of the more expensive flexible tubes with wire in the interior, and the plaited outer cover, is a source of danger and annoyance to which Mr. Papworth very properly called attention; and the danger from the escape of gas from the meters, also mentioned by that very acute observer, is attributable to the want of proper supervision by the proper tradesmen. Whether a meter be placed in-doors or out of doors, its decay from the chemical action of the gas upon the inside of the lining, or case, must take place under the same circumstances; and, though unquestionably there would be less danger if a leakage were to take place whilst the meter is out of doors, the real remedy to the supposed evil is to have the meter examined and repaired as often as is necessary by competent parties. When gas has once been properly laid on, it is apparently so simple, that every body fancies himself to be competent to manage it; and there is a dendency on the part of the public to consider that any body is able to practise as a gas-fitter. The consequence has been, that many persons assume that title who are totally ignorant of the trade, and who have caused it to fall miserably in public estimation. Most of the dangers from the use of gas cited by Messrs. Braidwood and Papworth would be obviated by simply employing competent men and the best materials. No governmental action can secure this result.

Circular to Gas Companies.

Our readers have, no doubt, noticed that an active controversy is in progress with respect to the primary honour and legal right of using oxide of iron in the purification of gas. The subject was long ago fully discussed in our columns, and nothing has since transpired which sensibly affects the conclusions then arrived at. Those conclusions, it will perhaps be remembered, assigned to Mr. Croll the merit of first employing oxide of iron, whilst to Messrs. F. J. Evans and Laming it awarded the discovery of the process of revivification, which alone gives practical value to the invention of Mr. Croll. It would appear, however, that this simple view of the case is by no means satisfactory to all parties; therefore we willingly resume the whole question, by giving a brief outline of the facts as they stand recorded; and, as usual, we shall be happy to afford space for a temperate exhibition of both sides of the matter.

On the 29th of July, 1840, Mr. Croll took out the first patent for purifying gas by means of certain metallic oxides. Under this patent he claimed the use of the oxide of manganese, the oxides of iron, and the oxide of zinc; but he claimed them only when used in the manner and in the particular stage of the operation above described, and "*not otherwise.*" Now this manner and stage were in a dry-lime purifier, damped as lime is damped, and *after the removal* of the ammonia.

This unfortunate disclaimer, for such it really was, did not escape the legal acumen of Mr. Laming, who thereupon took out his patent for the use of "oxide of iron, manganese, and zinc, mixed with chloride of calcium," or some similar agent, by which the gas could be freed at once from its ammonia and sulphuretted hydrogen, *without* requiring a succession of vessels. In this way he hoped to evade Croll's patent, and, probably in a legal sense, did so, in consequence of the remarkable disclaimer above alluded to.

This mixture was tried at the Westminster station of the Chartered Gas-Works, and found to answer; and in the months of August and September, 1849, the gas, or at least a large portion of it was practically purified and sent out to the public; and the same kind of mixture, containing oxide of iron and chloride of calcium, has been continued to be used at the works in question up to the present time, under license from Laming's assigns.

Mr. Hills, on the 28th of November, 1849, took out a patent "*for compressing peat for making fuel or gas, and of manufacturing gas, and of obtaining certain substances applicable to purifying the same.*" In the title there is not one word about any improvement in *purifying* gas, but only for *manufacturing* gas, and *obtaining* certain substances for purifying the same. Upon the title alone, therefore, this cannot include an improvement in "purifying," but only in "obtaining;" nor does the deposit paper, which ought more fully and clearly to explain the real nature of the invention, mention oxide of iron. The following is the deposit-paper *in extenso*:—

1. For compressing peat between inclined planes and rollers, with absorbent substances interposed.
2. For carbonising coals, &c. &c., in retorts and furnaces, by passing atmospheric air through the fuel therein contained, and, when sufficiently hot, introducing the charge of coals, &c., to be carbonised; which coal, &c., should be previously heated, and then excluding the air; also by passing highly-heated gases through it in the retorts or furnaces.
3. For obtaining alumina, or alum, from aluminous shale, for purifying gas, or other purposes, by causing sulphuric acid to pass through it.
4. For arrangements of pipes, &c., for distributing liquids in gas purifiers.
5. For absorbing sulphuretted hydrogen and other gases into porous bodies, and removing them again either by heat or by taking off the pressure of the atmosphere.
6. For heating the coal, &c., to be carbonised before putting them into the retorts or furnaces.

The only agents here spoken of for purifying gas, are alumina and alum, and the whole intention is stated to be for "obtaining" them. It is true, it speaks of absorbing sulphuretted hydrogen and other gases into *porous* bodies, and removing them, &c.; but the sulphuretted hydrogen cannot be removed from oxide of iron, either by heat or taking off atmospheric pressure; in short, it cannot be removed at all; and this is precisely the peculiar value of oxide of iron; it *can* be removed from lime, and hence the nuisance. Indeed, sulphurretted hydrogen cannot properly be said to be "absorbed" into oxide of iron, nor is it in this sense "a porous body," as the sulphuretted hydrogen combines chemically with it, independently of any porous absorption; and no better proof of this is needed than the fact, that all porous oxides of iron are not equally fitted for the purification of gas.

If, however, the words oxide of iron had even been mentioned in the deposit-paper, the prior claim of Mr. Croll would necessarily have invalidated any title to its use, except with respect to any improvement; and even then, as a most respectable authority (Mr. Rotch) has laid it down, a licence from Mr. Croll would have been requisite in the first instance. Admitting, therefore, that the mixing of chloride of calcium, as proposed by Mr. Laming, and of saw-dust, as proposed by Mr. Hills, with the oxide of iron, were really improvements upon Croll's invention, these improvements could give no right, and still less an exclusive right, to the employment of oxide of iron alone, or combined with other agents not mentioned by any of the patentees.

Then, again, we find in the title that "substances" are to be obtained for purifying gas, whereas in the deposit-paper the only substance which will purify gas is alum—the other agent mentioned, "alumina," having no such power; and yet in the specification nothing is said about either alum or alumina, but many substances are introduced not included in the deposit-paper.

Hence several of the gas companies in the country are using oxide of iron in various forms of combination, without the most remote idea that any infringement of any patent-right takes place; whilst others are quietly paying royalties to one or other of the two claimants, under an impression that patent-rights do exist. It seems to us, then, that a question of this importance requires a speedy decision, in accordance with the dictates of justice. On sanitary grounds, the disuse of lime for the purification of gas has become an absolute necessity; and therefore, if no legal impediment to the free employment of oxide of iron prevails, we can find no excuse for the continuance of a practice which generates a nuisance so easily obviated: whereas, if a patent-right still exists, no matter to whom belonging, we shall be happy to see its possessor reap the reward of his meritorious utility. Affairs of this kind may be adjusted without any very expensive litigation, and certainly without even the shadow of personal animosity. Let reason and a proper sense of equity prevail, and there can be no doubt of a satisfactory termination of such a dispute. The pecuniary interests of gas-lighting are, indeed, involved in the issue, but not so much so as they are in the maintenance of justice to all.

A very interesting case connected with the rating of a country gas-work is likely to be shortly brought before the public, in which a principle of great moment for such undertakings is involved. An appeal, in this instance, has been

laid against a rate on the ground of its inequality, because the fixed plant of the gas company had been rated—whereas, the fixed plant of the various factories in the neighbourhood had been exempted. The whole of this question is in a most unsatisfactory state, and we cannot avoid expressing our conviction that the law has been stretched to the utmost against companies—in the metropolis equally as in the provinces; nor until the companies combine to force the question upon the consideration of the Legislature do we see that any remedy to the existing injustice can be found. These questions are still regulated by an act of 43 Elizabeth, c. 2, which was designed to meet the requirements of a state of society essentially different from that which now exists; but, even if all discussion be waived with respect to the correctness of the system upon which the burden of the support of the poor should be apportioned upon the various descriptions of property, the mode in which it is applied appears to us illogical and unjust in the extreme. In the cases of gas companies, for instance, it is customary to rate the retorts, mains, and pipes, which are, in fact, nothing but fixed plant; and the latter are only laid in the enjoyment of an easement under public ways, and cannot constitute either a profitable occupation of the ground, or entail any charge upon the parish; whereas, in most towns, bakers' ovens, brewers' vats, fixed machinery, &c., which are as distinctly and decidedly fixed plant, are exempted—in practice, if not in law. If the appeal to which we have alluded should be successful, it may lead to interminable litigation; and really it seems to us that the various canal, railway, gas, and water companies ought at once to make a vigorous effort to put an end to the injustice to which they are exposed. The tendency to increase the burthens upon the rates by the creation of municipal bodies for the execution of public works formerly left to private industry, renders it of daily increasing importance to remove at least any uncertainty which may prevail with respect to the mode of assessing them upon properties often unable to derive any benefit from the works so undertaken.

Communicated Articles.

VICAT'S THEORETICAL AND PRACTICAL TREATISE UPON THE COMPOSITION OF MORTARS, CEMENTS, &c.

It must afford great interest to those who have followed the history of the progressive application of abstract science to the various operations of engineering, to observe, that towards the close of an actively and well-spent life, M. Vicat still retains enough energy to be able to group together the results of his long-continued and valuable researches. Any publication emanating from him must call for attention from us; still more powerfully, however, must it be arrested when he endeavours to resume in one comprehensive statement the existing state of scientific knowledge upon a subject of such vital importance to the class of operations with which this Journal is most immediately connected. Unfortunately, there are very few works in our language which discuss the nature and properties of the class of materials M. Vicat has studied with such perseverance; and although our chemists have occasionally turned aside to examine the laws connected with them, we are still without any original or consecutive treatise upon limes and cements. Yet it is notorious to engineers who have paid attention to these investigations, that many of the usually received opinions with respect to them are radically incorrect, and that even many of M. Vicat's theories are open to serious doubt; whilst the practice of our builders in the application of this class of materials is essentially defective. Perhaps a short statement of the contents of M. Vicat's last publication may induce our professional and scientific authorities to redeem this important branch of the arts of construction from the neglect, and consequently from the empiricism, to which we have of late abandoned it.

It will, no doubt, be within the knowledge of most educated engineers, that about the year 1828, M. Vicat published a statement of the existing state of our knowledge on the subject of limes and cements, which has been translated into our language by Captain Smith, of the Royal Engineers. Since that period, the extraordinary building operations which have been required for the formation of the countless harbours, docks, canals, roads, bridges, railroads, &c., constructed under the influence of the long peace, have compelled engineers to study the character and normal conditions of the various materials of the class we are now discussing; and the French, German, and Italians have made numerous additions to the records of facts connected with them. In the "*Annales des Ponts et Chaussées*," in the "*Comptes Rendues de l'Académie des Sciences*," in the "Transactions," and the infinite number of serial publications to be met with in every country in civilised Europe, notices upon local sources of limes and cements have been inserted, and countless experiments have been made and recorded for the purpose of supplying any deficiencies or remedying any defects in the materials furnished by nature. All these researches and experiments have been guided by the opinions propounded by Vicat in 1828, so far at least as the chemical philosophy involved in the question is concerned; nor, in spite of the extraordinary amount of skill and ingenuity of the observers, can we safely assert that any real advance has since then been made in the stock of our knowledge of the laws upon which this particular class of materials act. New cements have been introduced, artificial hydraulic limes, and pouzzalanos have been recommended, and applied with variable success; but in all cases the reasoning which has guided their inventors has been the same with that originally propounded by Vicat in his "*Resumé*," or in the detached essays preceding its publication; nor can we point even now with any satisfaction to authorities able to guide us in the explanation of many strange phenomena Vicat's doctrines are incapable of accounting for. His works, then, must still be considered to represent the actual state of scientific and technical knowledge on the subject of limes and cements; and a condensed statement of their contents may serve, at the same time, to call attention to the weak and defective portions of the theory on which they are founded.

M. Vicat commences his recent publication by a short description of the chemistry of the four important elements of the cementitious materials which enter into the composition of the mixtures used to bind together the stones, &c., used for building operations. These elements are—1, lime; 2, silica; 3, alumina; 4, magnesia.

1. Lime is a metallic oxide of the class of the earthy alkalies; it is white, of a sour taste, warm and caustic; it dissolves in 1000 times its own bulk of cold water, and in double that quantity of boiling water; when sprinkled with water it absorbs that fluid with avidity, and solidifies it, giving off in so doing a heat which raises the thermometer to 300° centigrade; from this combination a hydrate results, which in its natural state of dryness only retains 0·25 of water. Lime is a weak base, yielding easily to acids; it contains 100 parts of metal, or calcium, and 39·08 of oxygen; its atomic weight is 350·00, and its atom contains 1 atom of metal and 1 of oxygen: united with carbonic acid, in the proportions of 56·40 to 43·60, it constitutes the calcareous rocks which form one of the principal zones in the earth's crust.

2. Silica, as prepared in laboratories, is a white floury substance, without taste, inattackable by ordinary acids, insoluble in water, and composed of 100 parts of the metal silicium, and 108·16 parts of oxygen; its atom, composed of 3 atoms of oxygen and 1 of the metal, weighs 566·70. The silica of mineralogists, known by the name of quartz, only differs from chemical silica in its state of greater cohesion, due to its crystalline structure: in this state it resists certain chemical agents in which silica, properly so called, is easily dissolved, and does not enter into combinations easily effected by the chemical variety: thus liquid potossa will dissolve silica without affecting quartz.

3. Alumina is, like silica, white, pulverulent, and excessively hard in its crystalline state, but soft to the touch, and of feeble cohesion when separated from a combination and dried at a low temperature; in this state acids attack it easily, but when greatly burnt it resists their action in as marked a manner. It contains 100 parts of the metal, or aluminium, and 87·61 parts of oxygen; its atom is composed of 2 atoms of metal and 3 atoms of oxygen; and it weighs 641·96.

4. Magnesia is found as a white powder, excessively light and soft to the touch; it combines easily with all the acids, and attracts carbonic acid very powerfully. It is composed of 100 parts of the metal, or magnesium, and 63·16 parts of oxygen; its atom contains one atom of the metal, and one of oxygen; it weighs 251·30.

The atomic weights given above are calculated with reference to the weight of oxygen represented by 100.

These are the principal elements which, combined in various proportions, constitute the materials known amongst builders by the names of hydraulic limes, cements, puozzalanos, or the compositions which, in the humid way, form the *gangues*, binding together the aggregations known by the names of mortars or concretes. In these *gangues* the silica performs the part of an acid, and gives rise to silicates, of which the other elements, either together or separately, become the bases. Little attention need be paid to the oxides of iron or of manganese, or to the other substances which are occasionally associated with the silicates; because the effect of their presence is little known, and they are more often injurious than useful. We may, however, here observe, that the German chemists differ from M. Vicat with respect to the influence of some of the accidental impurities, such as he seems to consider all the substances to be, except the four elements above enumerated, to be met with in many of the materials usually employed in the arts. In the subsequent parts of this notice we may have occasion to return to this question; at present we continue M. Vicat's description of the sources resorted to for the purpose of obtaining the various elements before described, which do not occur naturally in a state immediately fitted for use. Amongst these may be cited the limestones, either pure, argillaceous, or magnesian; the clays, sands, volcanic substances, or the materials arising from the decomposition of more ancient rocks.

Limestones.—Any stone is called a limestone which, upon calcination, can yield lime. Pure limestone, or the carbonate of lime of the mineralogists, is composed of 56·40 parts of lime, and 43·60 of carbonic acid, and is found abundantly in nature. It dissolves easily in acids when pure, or when mixed with carbonate of magnesia, but leaves a deposit when it contains clay, sand, or metallic

oxides. It enters into combination with numerous substances, and thence assumes many strongly-defined appearances, known by the names of the compact, coarse, chalky, granular, lamellar, schistous, saccharoid, &c., limestones. The purest carbonates of lime are found in the primary foundations, and occasionally, as in the case of the Carrara marble, in the most recent ones: in the transition series, tolerable pure carbonates are found, but their fracture is rather granular than crystalline. It is, however, in the jurassic or oolitic series, in the chalk, and in the tertiary strata, that the largest deposits of limestone used for commercial purposes are to be met with. The limestones they furnish are, generally speaking, impure; clay is the substance with which they are usually impregnated, and it occurs in variable proportions, often accompanied by oxide of iron, manganese, sand, quartz, sulphate of iron, altered organic or vegetable substances, &c. Sometimes, also, rocks are found containing a mixture of the carbonate of lime and of magnesia, which assume the name of dolomites when the latter base is present in considerable proportions.

Neither the colour or texture of a rock can be relied upon as an infallible indication of its real composition; only it has been observed that clay is more frequently found in the tissue of the softer stones, of a dirty or cindery grey colour, than in those of brighter colour, and of a more compact and crystalline texture. Argillaceous limestones, moreover, are easily affected by the action of the atmosphere; they part with a portion of their carbonate of lime (according to M. Vicat, which we doubt, unless the action be secular); frost breaks down the exposed surface, reducing it to a fine powder, which rains change into a marly kind of mud. All these indications, however, are too uncertain to serve as a guide to an appreciation of the purity of a limestone; and it is necessary, in order to form a correct opinion upon the subject, to perform a distinct analysis, which may be done roughly in the following manner:—The stone should be pounded and passed through a sieve; a small and carefully-weighed portion should be put into a glass, and enough pure water added to bring the mixture to the state of a thin cream; then azotic or hydro-chloric acid should be gradually added, shaking the vessel the while, until all effervescence has ceased. If the whole of the powder should dissolve, or if only a very small deposit be left, it is a proof that the stone experimented upon is pure, or nearly so; unless it should contain carbonate of magnesia, which will dissolve in the same manner as the carbonate of lime, though more slowly. If, however, a greyish or greenish deposit be left at the bottom of the vessel, it will be generally found to be clay, mixed, perhaps, with sand or organic matters. M. Vicat adds that, although in this manner a very near approximation may be made to the composition of a stone, the wisest course is to refer the analysis of any material of this description to experienced chemists. He also adds, that it is essential that the sample to be examined should be selected from the body of the rock, not from any exposed portion, insomuch as the long-continued action of atmospheric influences produces great modifications in its nature.

Calcination.—Limestones are converted into lime by the property which heat possesses of driving off the carbonic acid present in them. With the same temperature, the calcination is effected the most rapidly when the texture of the stone is loose, and the dimensions are small. Pure limestones will support a white heat without inconvenience; argillaceous limestones soften, and undergo a species of fusion, with the greater ease, in proportion to the quantity of clay they may contain: their calcination, therefore, requires a moderate degree of heat, to be ascertained experimentally in each particular case. We shall have occasion to remark hereafter, when alluding to the manufacture of Portland cement, that an extreme degree of heat produces effects upon some artificial mixtures of lime and clay which M. Vicat has not alluded to.

There exists a very remarkable treatise, in French, upon the art of lime-burning, by M. Petot, in which the relative advantages of the various forms of kilns are discussed, and the various modes and conditions of working them are described. To this work, entitled "*Récherches sur la Chaufournerie*," the reader is referred for further information; it may suffice here to say, that the best kilns require a quantity of coal equal to about one-third of the volume of the limestone to be burnt, in order to effect a perfect calcination.

The various limes produced by the calcination of the natural limestones are classed, in building phraseology, under the names of the *rich*, the *poor*, or the *hydraulic* limes. The *rich* limes are those which, upon addition of the proper quantity of water, pass into a fine rich paste, of much greater volume than the lime itself; this paste, if kept from contact with the air, remains soft for indefinite periods in damp positions, and would be entirely dissolved in running water. *Poor* limes yield a paste of a harsh friable character, but slightly greater in volume than the lime; they are usually obtained from stones charged with sand, united with the peroxide or protosilicate of iron, and also from the dolomites or the magnesian limestones; in other respects the poor limes act in a manner similar to that of the rich varieties. *Hydraulic* limes are so named because the paste made from them is able to set or harden under water, as well as in damp situations, or in the open air. The paste they yield is not so fine as that of the rich limes, nor does it increase in bulk upon slacking, as do the latter; their hydraulic qualities depend upon the quantity of clay which impregnates the limestones from which they are made, in proportions varying between 12 and 20 per cent; and, as the degree of hydraulicity, so to speak, depends upon the proportion of clay present, the limes of this description are called *eminently*, *moderately*, or *feebly* hydraulic, according as limestones contain either from 17 to 20, 15 to 17, or 12 to 15 per cent. of clay. The clay in all these cases is supposed to be of the purest description, and to contain about 64 parts of silica to 36 of alumina. Good hydraulic limes, of the class thus described as eminently hydraulic, will set under water after intervals varying between two and six days, according to the season; for the temperature of the water has great influence upon the rapidity of the setting; after a month the limes are sensibly hard, and after six months they can only be broken by sharp blows. Moderately hydraulic limes will only set under water after an interval of between six and nine days; after an interval of four or five months its hardness will not exceed that of ordinary brick clay: whilst the feebly hydrulic limes will only set after intervals of from 9 to 15 days, and after six months their degree of hardness will not exceed that of fresh-dried soap.

It is important, however, M. Vicat very justly observes, to bear in mind that the rapidity of setting of hydraulic limes may often prove a very unsafe criterion of their ultimate value, as the relative proportions of alumina and silica in the clay will materially affect both the rate of setting and the hardness the limes may ultimately attain. From some practical observations upon the limestones used in France, he was led to the conviction, to which theoretical reasoning also points, that thee xcess of alumina in the clay will accelerate the hardening of the mass in the beginning, but that the excess of silica retards it at first, although eventually it increases the hardness. The peroxides of iron, the manganese, and the sand, which are found in most clays, are at least inert, even if they be not injurious; and therefore the indications of hydraulicity, as M. Vicat calls the proportions of the elements which co-operate to produce the desired peculiar condition of limestones, must be calculated simply with reference to the proportions between the caustic lime, the silica, the alumina, and the magnesia, if there be any present.

Occasionally calcareous substances are found, which, independantly of a certain proportion of clay, contain the carbonate of magnesia. When the composition of these limestones varies between 20 to 25 parts of the latter ingredient, together with from 10 to 14 parts of clay, and from 65 to 66 of pure carbonate of lime, very excellent hydraulic limes may be obtained from them. These limes are called *magnesian* limes; and they must not be confounded with the dolomitic limes, because, as the latter contain neither silica nor allumina, they cannot be hydraulic.

From the above, it would appear that no hydraulic limes can exist without silica; and that, considered chemically, those limes as they leave the kiln are true silicates, formed in the dry manner.

Nearly all the previous reasoning upon the subject of limes will be found in M. Vicat's early works; and, acting upon the theoretical conclusions to which it had led him, he had, even so far back as 1820, established some works near Paris for the preparation of artificial hydraulic limes, in which it was proposed to mingle the various ingredients according to the required theoretical proportions. When pure caustic lime was used, M. Vicat recommended that about 100 parts of the anhydrous lime should be mixed with from 40 to 44 parts of pure clay; or when chalk was used, that 178 parts of that material should be used instead of 100 parts of the caustic lime. In the construction of the fortifications of Paris, the artificial hydraulic limes thus made were used to a great extent; and M. Vicat states, that, if a clay could be employed containing a large proportion of soluble silica (from 35 to 40 per cent.), the lime so obtained might be advantageously used for sea works. M. Signorile, a Piedmontese engineer, has, however, called attention to a fact which may often seriously affect the resistance of these compound materials, viz., that if the combustible used for calcination should contain any notable proportion of sulphur, the lime in the mixture is exposed to enter into combination with it, and to produce, in irregular quantities, a sulphate of lime able to disintegrate the carbonates associated with it.

(*To be continued.*)

Correspondence.

HANSOR'S OLEFIANT GAS COMPANY.

SIR,—An engagement in Belgium, and consequent absence from England, have prevented me from seeing the JOURNAL OF GAS LIGHTING of the 27th ult. at the time of its publication, and from replying to Mr. Hansor's letter in your following number. I do so now.

It is *one* thing for a man to say in general terms that he doubts your calculations, but it is *another* to prove them to be wrong. Had Mr. Hansor done this, it would have looked better than to have made an attack upon the "black diamond" establishment—the more especially as his knowledge of such works must be exceedingly limited.

In writing my letter, I neither wished nor expected to obtain for my remarks Mr. Hansor's "estimation." I stated that which I defy Mr. Hansor to disprove, which was—taking the Olefiant Gas Company's prospectus *as it appeared in the public papers*, the gas

cost 16s. 8d. per 1000 cubic feet; while gas may be made from Boghead cannel, on a *similarly small scale, at 6s. per 1000 cubic feet, and of double the illuminating power.* Therefore, instead of a light equal to nine candles, costing *one halfpenny per hour*—as the company say—a similar one from Boghead cannel will only cost *one-tenth of a penny.* Every one else but Mr. Hansor will understand my "calculations" and my "logic."

I may also state, that what Mr. Hansor claims as *his* invention—namely, the "double process" system—has been used by me five years ago in several establishments, and abandoned, because I found that the extra wear and tear and fuel cost more money than the value of the additional gas produced.

When the Olefiant Gas Company is numbered among the things that were, and when Mr. Hansor has expended "a little more money for a little more skill," then he will find out the solution of my problem, and the deduction of my "logic."

St. Neot's, June 19, 1856. GEO. BOWER.

Register of New Patents.

2712.—JAMES MURDOCH NAPIER, of the York-road, Lambeth, in the co. of Surrey, for "*An improvement in drying small coal.*" Provisional Protection only obtained. Dated Dec. 1, 1855.

Small coal is now very commonly washed to render it more suitable for various purposes. This invention consists in causing small coal, when in a wet or damp state, to be passed through a stove or oven at one end, and by the working of the parts thereof, or the machinery in connection therewith, the coal may be progressively moved through the stove or oven, and be delivered therefrom at the other end; for which purpose a stove or oven is employed, arranged in the following manner:—At one end of the oven or stove there is a cover or arch. The products of combustion pass from the fire under the cover or arch to the flue or chimney. The bed of the stove or oven is formed to an inclination, and is composed of several shelves or steps, some or all of which are moveable. The moveable steps or shelves are carried by a frame or frames caused to reciprocate or move to and fro a short distance. The damp or wet small coal is supplied at the upper end of the bed of the stove or oven from a hopper, and it is caused to descend down the inclined bed by the movement of the steps. The small coal, when dried, is allowed to pass out of the stove or oven at the lower end thereof. In some cases, when the small coal has much moisture therewith, a centrifugal machine, capable of receiving and discharging the small coal continuously, is first used to separate a quantity of the fluid, and then the drying is completed as above.

2786.—RICHARD ARCHIBALD BROOMAN, of 166, Fleet-street, City of London, patent agent, for "*Improvements in manufacturing gas from peat, and in treating hydrogen gas in order to render it illuminating.*" Patent dated Dec. 10, 1855.

This invention consists in certain methods of preparing gas from peat and hydrogen, and rendering it illuminating by means of certain improved processes, and of apparatus for effecting the desiccation and carburetting of the gas, and for distilling and treating the tar employed in the process.

Peat Gas.—A retort, made of cast iron or fire-clay, similar to those used for coal gas, is first filled and closed with a suitable stopper, and the furnace containing it is heated to the same temperature as that required for distilling coal for producing coal gas, or other suitable temperature. The gas evolved passes into a cylindrical receiver, carrying with it the tar oils and ammoniacal waters, the greater portion of which becomes disengaged from the gas in the receiver and condenser therein.

The gas passes thence into a condenser, similar to that used for producing coal gas, in which the tar oils and ammoniacal waters which may have escaped the action of the cylindrical receiver are condensed. The gas then passes through purifying and drying apparatus. The object of the drier or drying apparatus is to liberate the gas from the particles of water or humid vapours it may contain, and which would prevent its becoming carburetted, and thus acquiring the necessary illuminating properties. This drier contains pumice-stone, coke, or brick, impregnated with sulphuric acid.

The mode of operation for peat gas is as follows:—The patentee first regulates the flow of tar so that it shall enter the retort in proportion to the volume of gas produced. The retorts are then charged regularly, and the charge for each retort is carefully weighed. The retorts should be completely filled up with peat, as it is subject to considerable depreciation while being carbonised. From the retort the raw gas oozes through a tube into a receiver, in which it deposits a portion of its condensible products, and is thence conveyed through condensing and purifying apparatus similar to those employed in the manufacture of coal gas; but, contrary to the usual practice, it is preferred to place the washing vessels after the purifiers, because on leaving the latter the gas contains free ammonia in a state of vapour, which is soluble in water. Thence the gas passes through a regulator or small gasometer, which receives the gas and keeps up an uniform pressure on the retorts, when communication has to be shut off with the carburetting retort. The gas is next conveyed into the driers or drying apparatus, which consist of a number of vertical cylindrical vessels containing pumice-stone; each cylinder has a double bottom and two side openings—one near the top for admitting the gas, and the other at bottom for its exit; and also an opening in the top, directly over the false bottom, for introducing pumice-stone; and an opening at bottom for removing it. The waters of condensation escape through holes formed in the double bottom of the cylinder. From the driers the gas is conveyed into the carburetting retort, into which it is admitted through a double syphon, which also admits the tar. The gas having circulated through the retort above and below a diaphragm across and among certain substances placed there to increase the heating surface, escapes through the lower branch of the syphon into a receiver containing water, in which it deposits any excess of tar which it may have acquired. To prevent, however, any waste of tar, a condenser is provided, the refrigerating surface of which need not be extensive, as the oils easily condense on leaving the retort.

The claim is for—

1. The carburetting of peat and hydrogen gas by means of the tar from peat completely deprived of the watery particles which it may contain.

2. The separate preparation of peat gas and tar for the purpose of depriving them of the water and watery particles they may contain, and the subsequent reuniting of the anhydrous peat gas and tar, whereby a gas of strong illuminating properties is obtained.

3. The arrangement of apparatus for treating the two, especially in so far as regards the contrivance for removing the scum from the tar, the arrangement of the tubes and receivers for emptying and filling the retort without unfixing it, and the supplementary piece added to the mouth of the retort to prevent the escape of the scum and other matters with the products extracted.

4. The driers or apparatus for drying gas, hereinbefore described.

5. The processes and general arrangements of apparatus for manufacturing peat and hydrogen gas, before described.

2788.—JOSIAH GEORGE JENNINGS, of Great Charlotte-street, Blackfriar's Road, in the co. of Surrey, for "*Improvements in connecting earthenware rain-pipes and soil-pipes of water-closets, and in valve water-closets.*" Patent dated Dec. 10, 1855.

This invention has for its object better means of connecting earthenware rain-pipes and soil-pipes of water-closets; also an improvement in valve-water-closets.

For the purpose of connecting earthenware pipes for conducting off rain water from buildings, and the soil from water-closets, cast-iron sockets or junctions, of a peculiar form, are used. Each socket or junction is cast with an internal rib or projection, of the thickness of the earthenware pipes, which are to be fixed into it; and on the outside there is a lug or lugs to fix the junction or socket to a wall or part of a building. The junction or socket is fixed to the end of an earthenware pipe in the following manner:—There is a groove around and near the end of the pipe, so that when the end is introduced into the socket, and melted asphalte or cement is run into the socket between it and the pipe, there will be a good joint formed. In fixing the end of another pipe into the socket, a flexible washer or ring of vulcanised indiarubber is placed on the projection in the socket; and the whole of the surfaces are coated with red lead or suitable cement, and then the end of the other earthenware pipe is introduced, and a sound joint is made. And in making the surfaces of valve water-closets, in order to insure waterproof contact at all times when the valves are shut, a ring or surface of vulcanised indiarubber is applied to the seat of each valve; and in addition thereto, a ring or surface of vulcanised indiarubber is applied to the valve itself, in such manner that when the valve is shut the two rings or surfaces of vulcanised indiarubber come together and form a good joint.

The claim is for—

1. The mode of connecting earthenware rain-pipes and soil-pipes of water-closets, as hereinbefore described.

2. The construction of valve water-closets, as described.

2797.—JOHN HENRY JOHNSON, of 47, Lincoln's-Inn-Fields, in the co. of Middlesex, and of Glasgow, N.B., gentleman, for "*An improved apparatus for discovering the leakage or escape of gas.*" Patent dated Dec. 11, 1855.

This invention relates to a peculiar construction and arrangement of apparatus for giving intimation or notice of any leakage or escape of gas in buildings lighted by that medium.

The apparatus consists of a cylinder, with a bed-plate for the facility of attachment to a wall or other convenient object, to the lower extremity of which cylinder is fitted a pipe, connected to a force-pump, which may be worked by hand, or by other suitable means. Air is drawn in at one aperture of the pump, and forced into the pipe and cylinder by another aperture, whence it passes to the supply-pipes, and to two side tubes in connection—the one with a dial pressure-gauge, and the other with a mercurial gauge, for indicating the pressure in the gas-pipes; all the cocks at the burners and meter having been previously closed.

By using two gauges of different constructions, one will serve to verify the other. If desirable, one gauge may be used to indicate the pressure of the air, and the other the pressure of the gas, during its use.

A safety valve may be also fitted to the apparatus, to prevent any excess of pressure occurring in the pipes. Any leakage that may occur in the pipes will be readily indicated by the hissing of the air through the leaks.

In place of forcing air into the pipes, a vacuum may be made therein, the apparatus being worked in a reverse manner to that hereinbefore described. In some cases, a reservoir of compressed air, or a vacuum chamber, may be used, either with or without the force-pump, for establishing a pressure in the pipes and fittings.

The claim is for—

1. The general construction and arrangement of apparatus for discovering the leakage or escape of gas from gas-pipes and fittings by the aid of compressed air or vacuum, as hereinbefore described.

2. The peculiar construction and arrangement of apparatus for cleansing gas-pipes and fittings, and for expelling or removing any drops of moisture or condensed vapour therefrom, as hereinbefore described.

2828.—EDWARD ORANGE WILDMAN WHITEHOUSE, of Brighton, in the co. of Sussex, surgeon, for, "*Improvements in apparatus for measuring fluids.*" Patent dated Dec. 4, 1855.

This invention relates to a peculiar mode of obtaining a continuous and energetic movement of rotation from any current or column of fluid in motion, and of the construction and adaptation of mechanism or apparatus for the purpose of measuring or registering the flow of such fluid.

The principle upon which the invention is based, and for carrying out which the apparatus is designed and constructed, is the action of a column of fluid moving round a circular channel, or arc of a circle, and operating upon a number of fans or pallets revolving round a fixed centre.

This action is insured by the form and nature of the apparatus, which is such as to direct the full circumferential force of the fluid in motion upon a wheel or disc bearing fans or pallets, and placed in a cylinder, circular chamber, or slotted tube of ring-form, to which the fluid is admitted by a single aperture (at or near the circumference thereof), in such a manner and direction as to produce the circumferential or whirling motion required.

The wheel is carried round by the fluid in its rotation, and hence becomes, by connecting it with a count or train of wheels, an accurate means for the measurement or registration of the flow of any fluid. The propelling force, besides being applied in the most advantageous direction (viz., at right angles to the centre of motion), maintains its action continuously throughout the whole or nearly the whole of the revolution.

The claim is for—

1. The peculiar construction and arrangement of apparatus for measuring fluids, wherein a paddle-wheel is made to rotate by the action of the fluid to be measured inside an annular chamber of uniform area throughout, as hereinbefore described.

2. The peculiar construction and arrangement of apparatus for measuring fluids wherein the capacity of the measuring-drum or wheel itself constitutes the measuring power of the meter, as hereinbefore described.

3. The peculiar construction and arrangement of measuring-wheel or drum, as hereinbefore described.

2840.—Samuel Stewart, of 28, Clement's Lane, London, consulting engineer, for "*An improved combined engine and gas-exhauster.*" Provisional protection only obtained. Dated Dec. 15, 1855.

This invention refers to an improved combination of gas-exhauster and steam-engine, whereby action is communicated to the exhauster. It consists, in the first place, in placing the piston of the gas-exhauster, which is a cylinder or double-acting pump, in direct communication with the piston of a steam or other reciprocating engine; that is to say, the pistons of these parts are connected to the same rigid rod, or otherwise rigidly connected and reciprocated uniformly and simultaneously with each other. In order to maintain the due action of the machine, the piston-rod between the two cylinders is connected by a cross-head, which has a slot or open space in the centre; and this, with a crank placed on a suitable fly-wheel shaft, the crank-pin slides or moves in the slot of the cross-head as above-mentioned, with the motion of the piston-rod, thus giving a rotary movement to the fly-wheel shaft; or a connecting-rod or rods may be used for the same purpose. On the fly-wheel shaft is placed an eccentric with which to work the steam slide-valve of the engine, and also an eccentric with which to work a feed-pump, as in the ordinary steam-engine.

The exhauster consists of a double-acting pump or cylinder similar to that of a steam-engine, into which a metallic or otherwise gas-tight piston or plunger is made to work. This cylinder is provided with a single slide-valve similar to that of a steam-engine, but so arranged as to permit the tar or other deposit in the cylinder to run freely off by the pipes: the slide-valve of the exhauster is worked by an eccentric carn, or by other suitable motion from the fly-wheel shaft or other convenient part of the engine.

The said pump or exhauster, arranged with the slide-valve as described, may be actuated by any other suitable power for the purpose of exhausting gas from clay or other retorts, in order to relieve them from internal pressure.

2878.—Andrew Shanks, engineer, of 6, Robert Street, Adelphi, Westminster, for "*Certain improvements in instruments for indicating pressures.*" Patent dated Dec. 20, 1855.

The claim is for the use and application of the conical capsule made of leather or other suitable material, having internal and external flanges attached, as before described, permitting the free movement of the plug or piston, without leakage or sensible friction, while moving upwards or downwards.

2908.—David Dick, engineer, of Paisley, in the co. of Renfrew, N. B., for "*A new and improved regulator for gas.*" Patent dated Dec. 22, 1856.

This invention consists in the adaptation of a small quantity of mercury or other liquid moving with the apparatus, and so closing and opening the end of the inlet-pipe (which is bevelled or square at the orifice, as may be most suitable) as to regulate the supply in accordance with the demand, at one uniform pressure; thus affording an equable light and saving gas.

The claim is for making the mercury (or other fluid) valve moveable with any ordinary gasholder. The turning down and bevelling or notching the aperture through which the gas flows to the holder, and the adjusting the pressure by the differential lever.

NOTICES HAVE BEEN GIVEN OF INTENTION TO PROCEED WITH THE UNDERMENTIONED PATENTS.

454.—John Kingsford Field, of Lambeth, in the co. of Surrey, wax chandler, and Charles Humfrey, of 14, The Terrace, Camberwell, in the same co., gentleman, for "*Improvements in the manufacture of paraffine candles.*" Feb. 22, 1856.

439.—William Oliver Johnston, of Broomhill Colliery Acklington, Northumberland, engineer, and John Dixon, of High Bridge Works, Newcastle-upon-Tyne, engineer, for "*Improvements in cutting and working coal.*" Feb. 29, 1856.

1099.—William Basford, 16, Talbot Road, Kentish Town, in the co. of Middlesex, engineer, for "*Improvements in apparatus for purifying coal gas.*" May 9, 1856.

1223.—Job Cutler, of Sparkbrook, Birmingham, in the co. of Warwick, gentleman, for "*Improvements in the manufacture of metallic pipes or tubes, to be used for various purposes.*" May 22, 1856.

Legal Intelligence.

COURT OF EXCHEQUER.

June 9, 1856.

IMPERIAL GAS COMPANY *v.* PORTER.

The declaration in this case stated that the defendant wrongfully deprived the plaintiffs of certain gas, and converted it to his own use. There was also a count for goods sold and delivered, and upon account stated. The defendant pleaded to the first count not guilty; that the gas was not the property of the plaintiffs; and that he had taken the said gas by the leave and licence of the plaintiffs. To the second count he pleaded (except as to £2. 7s. 9d., which he paid into court) never indebted.

Mr. Knowles, in opening the plaintiffs' case, said, this was an action brought by the Imperial Gaslight and Coke Company against the defendant, to recover a sum of money from him as compensation for the use of gas, which it would be shown he had used, and for which he had made no payment whatever. The amount sought to be recovered was about £150, and the method by which that sum had been arrived at would be shown hereafter. The defendant was a greengrocer, and also a coal-dealer, and had two shops, Nos. 90 and 91, Goswell Road. He had dealt with the plaintiffs for a very long period, and up to the year 1844 he had two burners in his shop, for each of which he paid £5. 11s. 9d. In September of that year he signed a requisition to the plaintiffs to be supplied with gas for five burners, and to pay for the gas he used at the usual price of 7s. per 1000 feet, to be measured by a meter. The eighth condition which was contained in that requisition was, that in case of a meter not registering properly the amount of gas consumed, the person so consuming it should pay at the rate of so much per burner from the time when the meter was last found to be perfect. The defendant found the meter himself, as usual. It was made by Messrs. Crosley, who employed the defendant's son, and it was tested by the plaintiffs in the usual way by the water-test, and found to act correctly. During the first year, the number of feet registered by the meter amounted to 32,900, for which he paid £8.15s. 9d., during which period he had five burners in use. In 1846 he got two new burners put up; but, instead of there being an increase in the amount of gas consumed in the course of the year, there was a decrease of 7000 feet; and from 1848 to 1850 he had nine burners, and yet the consumption fell to 18,000 feet. The defendant must, therefore, have been fully aware that something was wrong, when for nine burners he was paying very little more than he had previously paid for one. The company in 1850 considered that there must be some mistake, and, supposing that the meter was out of order, they again tested it with water, but found that it acted accurately. It had then been returned to the defendant, who subsequently put up another burner, making altogether ten burners. In January last, a young man, who turned out to be the defendant's son, called at the plaintiffs' office in consequence of a quarrel he had had with his father, and stated something to them which induced them again to examine the meter, and they then discovered how the gas had passed without being registered. The gas, in entering the meter, had to go through a valve kept open by means of a float upon the water in the meter. The pressure forced the gas through a place where it was registered; and, if the water was allowed to get low, then a part escaped without being registered. In the present instance, the amount of water was nearly half a gallon less than there ought to have been, and the float had been kept up by means of one of its wires being bent. Whenever the inspector came—once a quarter—the amount of water was always found to be correct.

Mr. Baron Alderson: Is not this a case for the Old Bailey? You are opening a case of felony.

Mr. Knowles said, he could not prove that the defendant had tampered with the meter; he had no doubt that, if he was called, he would deny having done so. All that the company now said was, that, as the meter had not registered properly, the defendant was liable, under the eighth condition, to pay separately for each burner from the period when the meter was last examined, namely, in 1850. This, for ten burners, would be about £150. It would be seen, on examining the interior of the meter, that the water had been kept below its proper level. This case would be proved, and the verdict must be for the plaintiffs, for the amount they claimed.

The learned counsel was about to call witnesses in support of the case, as stated by him, when

Mr. Baron Alderson said: Would it not be a much more desirable thing to let some engineer determine the case? Sir Wm. Cubitt, for instance, would do it in a moment. It seems to me it would be the only just method of trying the question. It is not a question of law; and I tell you what I will do. If you will let some eminent engineer, such as Sir Wm. Cubitt, whom I have the pleasure of knowing, decide the case, if he will come and consult me, I will give him all the assistance in my power.

Mr. Sergeant Thomas said his client was a poor man, and could not afford to pay the expenses of an arbitration; and, thinking that his character was assailed by the charges now made against him, he would prefer the case to go to the jury. If, however, the plaintiffs would pay the expenses of the arbitration, he had no objection.

Mr. Baron Alderson: I think the defendant's character would be much better cleared by the case being properly tried, than by its being improperly tried. The charges, in fact, amount to felony. The question has been raised as to whether a person taking gas in a surreptitious manner is guilty of felony, and it has been decided that he is; persons have been tried for it and punished for it. As the defendant objects to the expense of an arbitration, I will take it myself, and charge him nothing.

Mr. Sergeant Thomas said the defendant had had gas from the plaintiffs for forty years, and no complaint had ever been alleged against him before.

It was then arranged that the learned judge should take it privately, after the sittings after term, in the Court of Exchequer Chamber.

Miscellaneous News.

OIL GAS SCHEMES *VERSUS* FACTS.

[From *Newton's London Journal of Arts and Sciences.*]

There is a singular disposition in the minds of some persons to revert back to antiquated usages and exploded theories, rather than adopt the practices which modern invention, aided by long experience, has brought into general employment. Such individuals will smile with contempt at the achievements of the Minié rifle, and point exultingly to the fabulous performances of Robin Hood or William Tell with the bow and arrow. If steam is mentioned, their thoughts turn not to the names of Watt, Ful-

ton, or Stephenson, but rest firmly anchored in the Marquis of Worcester; nay, even the electric telegraph seems, to their prejudiced eyes, less effective than the laborious agency of an Indian runner.

As long as people of this class exist, others will doubtless be found quite willing, at a reasonable remuneration, to gratify this or any similar peculiarity; so that no one need complain of neglect or interference with regard to the gratification of his humour, so long as he is able to pay for it. Thus the admirers of the bow and arrow will find toxophilite clubs and archery shops in abundance open to receive them: the man who "hates the rail" and its "express train" may yet be accommodated with a "post-chaise and pair;" and the elderly lady, who still shrinks from the fiery horrors of coal gas and lucifers, will not experience much trouble in procuring "a pound of eights" and a tinder-box. To practices of this kind no reasonable objection can be urged, though we may perhaps lament the cause of their continuance; but it may be said to amount to a national calamity when men of enterprise are found to participate in, or trade upon, this mental aberration, and expend their energies in demonstrating the commercial practicability of the impracticable. This is but a revival of the labours of the alchemists, to convert base metals into gold—the victim being led on, step by step, in the dark, until light first breaks in upon his bewildered mind through the yawning portal of commercial ruin.

It would be easy, unfortunately, for us to accumulate examples of this dangerous practice, and to show the enormous misery and mischief which have been caused by its operations; but this would be, at best, only a kind of posthumous advice—a shutting of the stable door after the steed had been stolen. We prefer to take, therefore, a present instance, and exhibit its probable consequences, so as to guide by instruction rather than deter by fear.

All the world (at least the civilised part of it) is aware that the manufacture of illuminating gas from oils, fats, resins, and oleaginous substances, was long ago practised as a competitive process to the manufacture of coal gas; and all the world knows that, in this respect, it proved a total failure, although aided and abetted by most of the talent and no small part of the capital of this country. In an engineering point of view, it had the accomplished skill of Messrs. John and Philip Taylor; in a chemical aspect, it embraced the conjoint genius of a Davy, a Henry, and a Faraday. Nor were our continental neighbours idle or indifferent upon the subject: to them, indeed, the question was still more momentous. England, with her large resources of coal, might look on, in such a case, with comparative calmness at the result; but for an essentially oil-producing country like France, Italy, or Spain, the economical production of gas from oil was an object of the highest national importance, and one which, as we know, largely engaged the attention of the French Government. To suppose, therefore, that anything was then left undone which could be done, is absurd; and to prove that no recent advantage has been gained, or is indeed possible, with respect to the bare manufacture, we need but direct the notice of our readers to the fact, that by means of the improved apparatus of Taylor and Martineau, in which broken bricks or pieces of coke were used so far back as the year 1824, "a total conversion of the whole of the oil," according to Dr. Ure, "was accomplished, without trouble or the escape of any unpleasant smell;" and the quality of this gas was such, that one cubic foot of it was found to go as far as four cubic feet of coal gas.

Now, we wish particularly to direct attention to the circumstances quoted above, viz., that the *whole* of the oil was converted into gas, and that the gas had four times the illuminating power of coal gas; because, when we come to compare these assertions with some of a much more modern date, we shall find that, as regards oil gas, there is nothing new even in assertion; nay, so close is the analogy throughout, that many of our readers will probably regard the following recapitulation of the advantages of oil gas, as taken from a recent advertisement in the *Times*, rather than as an extract from a prospectus of the year 1823:—"The advantages of oil gas, when contrasted with coal gas, are the following:—The material from which it is produced, containing no sulphur or other matter by which the gas is contaminated, there are no objections to its use on account of the suffocating smell in close rooms. It does no sort of injury to furniture, books, plate, pictures, paint, &c. All the costly and offensive operations of purifying the gas by lime, &c., are totally avoided when it is obtained from oil; and nothing is contained in oil gas which can possibly injure the metal of which the conveyance-pipes are made." Here, then, we have a description not only of the perfect art of making oil gas, but also a complete eulogium of its peculiar products. To conceive anything more finished than the total conversion of the oil into gas is clearly impossible; and we have yet to learn that anything additional to the above can be said in favour of such gas. Nevertheless, the manufacture of oil gas has proved a most decided failure; and there is not, we believe, throughout the whole world, a single public establishment for the fabrication of this gas now in existence: of several scores which have been started in this country not one remains, though thousands upon thousands of pounds have been squandered away in a reckless attempt to support them. Surely this alone ought to be sufficient to show the mercantile value of oil gas. But no, we are informed through the columns of the *Times* that something new has been discovered, and that, consequently, new results will follow; and this we are told on the authority of scientific testimony! Hence we are requested to forget all our past experience with respect to oil gas, and to believe that, in spite of the failure of all the practical and scientific men in Europe, the true secret has been at length discovered by one—nay, even by two—individuals (for there are rivals in the field) as yet unknown in the scientific world. But what is the pretended improvement so lately made in the production of oil gas according to scientific testimony? Is it to convert *more* than *all* the oil into gas? If not, where is the improvement? for we have seen that the whole of the oil was thus converted long ago. We are told by one scientific testimonial, that the new invention is for the conversion of the vapours of oil into gas by subjecting them to a higher heat than that which produced them! This is really the sum and substance of the new invention, as detailed in the testimonial. First, the oil is converted into vapour, and then this vapour is converted into gas: as if there was anything novel in this; or as if it were possible to make gas from oil in any other manner.

Not to trouble our readers with a long argument upon that which is self-evident to every practical man, we will merely give a hasty description of the apparatus employed by Taylor and Martineau, in this country, for decomposing oily matters, and by Daniell and Chaussenot for the distillation of resin and tar:—A retort, exactly similar to a common gas retort, was partially filled with broken bricks or pieces of coke, so as, in fact, to divide it into two distinct retorts, one of which was left empty whilst the other was filled, as has been described: the empty portion of the retort was that next the door, and was consequently the coolest: it was provided with a slanting plate or incline, down which the oil or resin was made to run slowly, so as to be converted into vapour; which vapour had then to traverse the mass of broken brick or coke contained in the other or hottest part of the retort, where it was converted into gas, and then made its escape into the hydraulic main—the apparatus for the supply of the oil or resin being exterior to the retort, and communicating with it by a tube. And to show how well it was understood that the oil or resin was first made into vapour in the cool part of the retort, and into gas in the hot or coke-containing portion, several patents were taken out for fancied improvements upon this apparatus by Jobard, Selligue, Val Marino, Sanders, Manby, White, and Radley; the latter of whom, in particular, alludes to a kind of separate retort kept at a high temperature, through which the vapours and gases from the other retort pass, so as to effect their thorough decomposition, in case any part had escaped the first action of the fire. This particular vessel Radley calls a "resolver," or "resolving sphere," in consequence of its presumed action, which was to resolve into permanent gases all the vapours of oil, resin, or tar which had not suffered decomposition in the first retort. It is therefore abundantly plain that the "new invention," the merit or profit of which is being contended for in the public journals by rival patentees, is not only old, but proved by its non-use to be worthless.

In fact, we do not see how it is possible, so far as the mere conversion of oil into gas is concerned, that any scientific improvement can take place, because the theory of the process is as well understood as gravitation, and the practice has been carried out in every available form. Nothing, in short, can more lucidly explain the operation, and show the necessity for converting the oily matters into vapour before they are made into gas, than the following quotation from Dr. Ure's "Dictionary of the Arts and Manufactures," p. 845, vol. i., article "Gas Light:"—"When oil, fats, resin, tar, &c., are employed for the production of gas, it is not sufficient to introduce these substances into the retorts, and heat them as is done with coals. In this case the greater part of them would distil over in the state of volatile oils, and very little gas be generated, only as much as corresponded to the quantity of fat, &c., in immediate contact with the retort. It becomes, therefore, necessary to fill the retorts with pieces of brick or coke, and to keep them in ignition while the oil, &c., is slowly introduced into the interior. The fats instantly assume the vaporous state, and thus coming into contact, upon an extensive surface, with the ignited bricks, are decomposed into combustible gases." To talk therefore of a new invention by which oil is fast converted into vapour, and subsequently into gas, by passing it through red-hot coke, is, to say the least, an exhibition of gross ignorance concerning the manufacture of oil gas, and more especially in one pretending to lead the public by testimonials.

But where, after all, are we to look for our advantage in making oil gas? or, what comes to the same thing, why has this kind of manufacture disappeared from amongst us? The answer is very easy: no kind of oleaginous mixture capable of generating good gas has ever yet been manufactured at less than than £8 per ton. Herein lies the whole secret of failure; there is no art required to make oil gas; the point is to get the material at

less than the price of good cannel coal. Not only has this never been done, but it has never even been approached. Take the most costly coal known in the market, the Boghead; call this what you will, say 40s. per ton. Can anything oleaginous be had which may compete with it? Most assuredly nothing. A ton of Boghead coal will yield 14,000 cubic feet of gas quite equal to the best oil gas, and it would require at least 140 gallons of good oil to make the same quantity. The oil, then, must be supplied to us at the rate of less than 3½d. per gallon to compete with this, the most expensive kind of coal. Has any one ever heard of oil at such a price? or is it wonderful that oil gas will not pay even in situations where coal gas cannot be obtained from a public company? We think there is no wonder in the matter, because even private consumers would find it cheaper to make and burn coal gas than oil gas. But what strikes us as wonderful in this matter is, that men of position will lend themselves to schemes which they ought to know are, commercially speaking, utterly unworthy of trust; and that a journal with the pretensions of the *Times* will give them notoriety in its editorial articles, which can have no other effect than to throw the public off their guard, and make them the victims of impracticable and exploded projects.

THE METROPOLITAN BOARD OF WORKS.

WEDNESDAY, JUNE 11.

A Special Meeting of the Board was held at Guildhall this day, for the purpose of considering the report of the engineer of the board on the sewerage interception and main drainage of the districts north of the Thames. Mr. THWAITES took the chair at twelve o'clock, and the minutes of the last meeting were read and approved.

THE GREAT NORTHERN DRAINAGE.

Mr. CORRIE presented a memorial from Messrs. Thomas Jackson and George Thornton, on the subject of the drainage of London on the north side of the Thames, with plans and sections and estimates for executing the necessary works. The memorial stated that the plan proposed consisted of the formation along the northern bank of the river of a deep main or tunnel sewer, all built in brick and cement, with the view of intercepting and receiving the sewerage immediately before it enters the Thames.

It would commence at Kensington Canal, immediately west of Battersea Bridge, at a depth of 45 feet below Trinity high-water mark, or about 48 feet beneath the surface of the ground, and receive in its course the drainage from all the present sewers, from the point of commencement just named to Gallion's Reach, where it would terminate at about 70 feet below Trinity high-water mark, and would there enter the wells of the engines, to be pumped up to reservoirs immediately adjoining.

After giving a minute estimate of the quantity of sewerage to be pumped out of London on the north side of the Thames, which is shown to be about 55,000,000 gallons per day, the memorial proceeds to point out that the *sectional form* of the proposed deep sewer is elliptical, and its inside size, at Kensington Canal, 16 feet vertical and 12 feet horizontal diameters, and terminates at Gallion's Reach with 20 feet and 16 feet diameters inside. The *length* of the tunnel sewer is 13¼ miles; total fall, 25 feet; speed of sewerage 2 miles per hour; and capacity of the whole sewer, from west to east end, 86,000,000 gallons, or 31,000,000 gallons more than the estimated average daily from London; and capacity of reservoirs also 86,000,000 gallons. This *deep tunnel* sewer will run at the depths mentioned, as near as accessible under the margin of the river; but it had been found necessary, to prevent any question of damage arising to surface property, to diverge occasionally from the river, to avoid running under important buildings, such as the Houses of Parliament, the abutments of the bridges, Somerset House, the Tower, the deep-piled foundations of the London, West India, and other docks, and entrances thereto, &c.,

The object the memorialists have in view in placing the sewer at the depth just mentioned is stated to be, to get as much as possible beneath the gravel and sand beds and other alluvial deposits forming the bed of the river, and, by placing the sewer in the clay beneath, avoid all filtration or other subwater entering it therefrom, and consequent increased and unnecessary pumping; thus preserving the sewer for sewerage alone—the purpose intended. It is not considered, however, that the depth is too great, as it has to pass under very many warehouses, quays, shipping, basins, &c., on the margin of the river, as well as under streets, important buildings, the entrance to the Limehouse Basin and Cut, the foundations to which are all, more or less, deeply piled; and at the outfall the depth is not more than necessary to ensure a safe passage into the river.

Should a very extraordinary storm-period arise, and of such continuance as to gorge the deep main and overpower the pumps, then, and in such case, the gates at the entrance to the reservoirs at Gallion's Reach are proposed to be thrown open, and the excess allowed to flow out into the river as a simple question of gravity—the natural fall of the river between Kensington Canal and Barking Creek being about six feet.

Should any catastrophe arise to the deep tunnel sewer, contrary to the best calculations, from any cause beyond human foresight to provide for, or to the pumps or reservoirs, or any repairs at any time be required in the same, so as to render it necessary to keep the deep main empty for the time being, a provision will be made in every sewer by which the sewerage is turned down its old course into the river at certain points. The mouth of all these old sewer outlets will be adapted for and provided with self-acting hanging doors, closing by the action of the tide, and opening when any pressure of the fluid from the interior requires egress into the river.

The plan provides for 1250-horse steam-power, and all necessary buildings for the same, to lift the quantity of 86,000,000 gallons of sewerage water from the deep tunnel sewer into the reservoirs at Gallion's Reach, and from thence into the river; but working day and night, as these engines must do, it is calculated that about 800 to 1000 horse-power will raise the ordinary supply of 55,000,000 gallons of sewerage into the reservoirs, and the 200 to 400 surplus horse-power will be kept in reserve for storm purposes and repairs.

At about every mile strip-gates are provided, which can be closed at any one of these points, when any deposits may have accumulated in the bottom thereof, to be flushed out. The gate being closed, the deep tunnel is pumped dry to the east, while the fluid sewerage is allowed to accumulate on the westward side, when the sluices provided in the gates are opened, and the full force of the sewerage from the west is allowed to rush into the empty space between that point and the pumps. The effect will be, to flush up and carry away all such deposits to the wells, and thence be lifted into the reservoirs.

At the point where the deep-tunnel sewer terminates, a receiver will be provided, built in brickwork in cement, from whence the wells in which the pumps are placed receive a continual supply of sewerage. Five wells are provided, each containing two pumps worked by a 250-horse-power steam-engine, which can all be worked in combination or separately. Each pair of pumps, and the well in which they are inserted, can be isolated from the rest by closing the receiving and discharging doors of the well, and the water being pumped therefrom through a connecting sewer by either adjoining engines, so as to effect any repairs that may be found necessary.

Two reservoirs are provided, built in brickwork in cement, each of about 6 acres capacity and 24 feet deep, and containing about 43,000,000 gallons of sewerage, at the termination of the deep-tunnel sewer. The bottom or floor of these reservoirs will be inverted in brickwork in cement upon concrete. Upon these inverts a series of pillars, also in brickwork in mortar, will be erected, on which a covering of arches will be spread over the entire tops of the reservoirs, so as to completely enclose and prevent any unpleasant smells arising therefrom. In order to cleanse these reservoirs, sewers and outlets are provided in the bottoms of the walls, to flush out any deposit into the river; but it is anticipated it will be found too valuable as manure to be allowed to pass into the Thames. Therefore gates have been provided in the passages, which will allow the reservoirs to be emptied of their fluids separately, and the deposits left bare. The passages are adapted for and intended to receive mud-boats into the reservoirs, and there left dry by the receding tide. The gates are then closed, and the next tide, if necessary, shut out, until the boats are loaded with the deposits before-mentioned, when the tide will be allowed to re-enter, and the boats pass back into the river. This operation can take place every tide, till either of the reservoirs is emptied of its valuable mud deposits.

A river wall will be built, so as effectually to prevent the wash from the reservoirs into the river from damaging its banks or sides; and by means of aprons provided at the entrance of each passage into the river, no disturbance or displacement shall take place in the bottom of the river.

On the well-known chemical qualities which lime has for the absorption and neutralisation of acids and ammonias, a means is prepared as a LIME-RECEIVER, down which lime can be thrown in such quantity as may on experience be found to meet the amount of acids and ammonias held in suspension, so as best to answer the aim of throwing down the deposits in the reservoirs, and, as far as practicable by this means, purifying the sewerage before entering the river. When these deposits amount to such a depth as to become necessary to take away, the mud-barges are to be introduced, as explained already under the head of reservoirs. It will be at once understood that the lime, being thrown down the receiver into the deep sewer immediately before the sewerage enters the wells, will at once come in contact with and be thoroughly agitated and mixed with the sewerage through the pumps, so as to give the lime complete action for its effect upon the sewerage.

Pipes will be laid, of sufficient size, from the reservoirs to the face of the river wall, to which will be attached elastic hose, for the purpose of filling vessels, &c., with the liquid sewerage, as a manure for the hop grounds of Kent, or other purpose, and for any part of the surrounding country or counties; and also, as the height of the top sewage is about 16 feet above the level of the adjacent marshes, preparation for pipes will be laid down and inserted through the walls of the reservoirs, to which further main pipes can be attached to convey liquid sewerage as a manure over large neighbouring districts; and, further, this liquid sewerage can be raised by pumps at any of the shafts between Battersea and Gallion's Reach, by which the local gardens and contiguous lands can be supplied, as far as may be found available to the consumer, as a question of cost.

In conclusion, the memorialists express their willingness that the engineers of the board should have full control of all the works in execution, and power to make such alteration in any details, or otherwise, as circumstances may, and frequently do, point out in practice.

Mr. THORNTON, who attended to explain his proposal, was interrogated at some length by the Chairman, Mr. Wright, Mr. Leslie, and other honourable members on matters of detail.

Mr. CORRIE then moved, and Mr. WILKINSON seconded, a motion to the effect that the plan of Messrs. Jackson and Thornton be under the consideration of the board at the same time as that of Mr. Bazalgette.

Mr. LESLIE thought that this was an inconvenient course, and very unfair to the gentlemen who had prepared other plans, of which no notice was taken.

The CHAIRMAN said he did not think the honourable mover would gain by this course.

Mr. CARPMAEL differed from previous speakers, and believed that it would be best to accept the motion, and deal with this question as they would any other.

Mr. HOWS said he thought there was something very tangible and practical in the plan now submitted; and, as the board had an efficient committee of works, it would be well to refer it to them for consideration and report.

The CHAIRMAN reminded the honourable member that no drainage works had been submitted to the committee to which he had referred; and, if this were handed over to them for discussion, so also should Mr. Bazalgette's, and there could be no doubt the board would see the impoliey of such a course.

Mr. LESLIE said it would also give a most decided and unfair preference to Messrs. Jackson and Thornton over other gentlemen who had proposed a tunnel scheme.

The motion was therefore withdrawn, and the memorial simply received.

THE ENGINEER'S REPORT ON THE NORTHERN DRAINAGE.

Mr. CARPMAEL congratulated the board that the period had now arrived when they could take into consideration the second portion of the great work which they had been called into existence to carry out. He had no doubt that members had by this time made themselves acquainted with every proposition for dealing with the drainage of so large and important an area. He had no means of knowing what course members desired to take in considering this matter; whether they desired to question the engineer in the first instance, or to hear the exposition of his (Mr. Carpmael's) views. However, thus far he might say, that he did not intend, as on the occasion of proposing the adoption of the scheme for the south side, to ask the board to adopt the whole of the report, because to do so would be an inconvenience, by reason of there being certain alternative propositions in regard to the low-level sewer. He therefore proposed to detach, for the purpose of the first resolution, the upper and middle level sewers, because they were works of the highest importance, and the execution of them would facilitate the carrying out of the low-level sewers, whatever alternative might be eventually adopted in reference to them. As regarded the low-level sewer, supposing he were successful in inducing the board to adopt the upper and middle lines, he should ask the board to refer it to the committee of works, in order to report specially on the alternatives he had alluded to. Those alternatives were—first, with regard to the mode of dealing with the western district; and, second, the construction of those parts of the sewer which passed through the Strand and Fleet Street. His reason for taking this course was, that the board had already referred to that committee the question of the embankment of the Thames, and it would be very advisable to consider the two questions together.

Mr. SAVAGE thought the better course would be, before entering upon any debate, to give an opportunity to every member of the board to propose such questions to Mr. Bazalgette as he might deem proper.

Mr. FEW seconded the motion.

Mr. LESLIE wished to ask the board whether they considered it wise to go into a lengthy discussion of any plan which proposed to empty the sewerage into the Thames within the limits of the metropolis, contrary to the act of Parliament?

The CHAIRMAN thought that such a question might very well be put, after by examination of the engineer, the board had the merits of his plan fully before them.

Mr. DAVIS said it appeared to him to be quite farcical to lose time debating a scheme which was contrary to the act of Parliament, and which, they were quite sure, they would never be allowed to carry out.

The CHAIRMAN: Would it not be better to put questions to the engineer as to whether the point of discharge may or may not affect the whole of his scheme; and if so, whether any extension is practicable?

Mr. DAVIS was quite ready to fall in with the suggestion, as he had been with a similar proposition in reference to the southern drainage.

The motion was then agreed to.

In reply to Mr. DAVIS,

Mr. BAZALGETTE stated, that during the preparation of his scheme it did occur to him that perhaps some objections of a technical nature might be brought forward in respect to the point of discharge; but, even if such objections should prevail, he saw various ways of getting over this difficulty, by

means of a slight deviation from the proposed plan, though this would somewhat spoil it. Under all the circumstances, he deemed it right to propose the best scheme in an engineering point of view. The present proposed outfall was clearly within the metropolitan boundary, but not within the metropolis proper, which virtually extended no further than the River Lea. There was, however, a small portion of land detached at Barking which was included in their jurisdiction; but it would be very easy for him to lay iron pipes into the creek and carry the sewerage beyond the boundary, or he could make his point of discharge a little nearer to London, and so take it beyond the bounds of the metropolis.

Mr. DAVIS: But it would still flow into the metropolis. Is not the very stream itself a part of the metropolis?

Mr. BAZALGETTE: I cannot answer that question.

Mr. DAVIS appealed to the chairman whether it was worth while going on with the discussion of the plan. (To Mr. Bazalgette): How far does this scheme differ from the one propounded in 1854?

Mr. BAZALGETTE: The point of discharge does not differ at all. I think that, although strictly and technically the spot referred to is regarded as a part of the metropolis, no man in his senses would, for practical purposes, consider it so. If you go to the spot and look around you, you cannot see a portion of the metropolis from it. I was there a little while back, and know that it is surrounded with cattle grazing ground.

Mr. DAVIS: How far does this plan differ in its general features from the one proposed by yourself and Mr. Haywood in 1854, and sanctioned by Sir W. Cubitt?

Mr. BAZALGETTE: It is pretty nearly the same plan.

Mr. LESLIE: I say that the whole of Gallion's Reach is within the metropolis.

Mr. DENNIS: In the event of having to go much further down the river, can you lay your mains deep enough below the creek?

Mr. BAZALGETTE: No; it would involve the necessity of a syphon under the river, unless you increase the amount of pumping. That part is within four feet of high-water mark. I think it would be very objectionable to try a syphon under the creek.

Mr. DENNIS: What is the thickness of the low-level sewer?

Mr. BAZALGETTE: The brickwork for the low-level sewer is 18 inches, and the whole is set in cement. I think that would be quite sufficient.

Mr. H. L. TAYLOR asked Mr. Bazalgette to point out on the plan where, according to the general impression, the metropolis terminated.

Mr. BAZALGETTE said, the green line (at the course of the Lea) represented the eastern boundary of the metropolis on the north side of the Thames.

Mr. H. L. TAYLOR: And your proposal is to carry the sewerage six miles below that?

Mr. BAZALGETTE: Yes.

Mr. H. L. TAYLOR: Is there a spot opposite to Plumstead which, from some peculiar circumstance, is considered a part of the metropolis?

Mr. BAZALGETTE: There is; it extends about a mile and a half in length, and half a mile in depth, and is part of the county of Kent on the north side.

Mr. DAVIS said the whole of the stream was either in the parish of Woolwich or that of Plumstead.

Major LYON expressed a wish to have Mr. Woolrych's opinion on the point.

Mr. WOOLRYCH said: The whole of the stream is not within the metropolis. There is a part between the River Lea and Barking which is, legally speaking, without the metropolis—I believe one half of the stream. Of course it would be difficult to prevent the sewerage passing over the line.

Major LYON: But there is a part of the Thames nearer to London than Barking which is not in the metropolis?

Mr. WOOLRYCH: Yes, there is.

Mr. LESLIE thought Mr. Woolrych could not have seen the maps of the Tithe Commissioners, which showed that the whole of the Thames was in the metropolis.

Major LYON: At page 22 of your report, there is this paragraph—"The sewerage will not deposit in the river, because the heavier matters will deposit in the reservoir and settling-pits; and the lighter portions will, therefore, not precipitate when discharged into, and exposed to, the action of the tides of the river. The Thames at Barking Reach will not be rendered less pure." Have you made any plan or calculation as to the mode of carrying away that deposit, or as to the expense?

Mr. BAZALGETTE: I have not. My view is, that the most economical mode will be to float barges into the reservoir while the tide is up, and when the water flows out, the refuse will be left in a comparatively dry state.

Major LYON: Will the sewerage have remained long enough in the reservoir for the whole of the heavier matters to fall?

Mr. BAZALGETTE: Certainly not the whole of it; some will undoubtedly remain in a state of suspension, but I believe a very large amount will be deposited.

Mr. OFFOR said the opposite or eastern side of the River Lea was under the jurisdiction of the Commissioners of Sewers for the county of Essex, and he inquired of the engineer whether it was not a fact that they were very desirous of joining with the metropolitan commissioners in works for the better draining of the district?

Mr. BAZALGETTE replied that such was the case. He had been in communication with the Essex commissioners, who had had this idea before them for years, and he believed that they were delaying important and extensive works, which, but for this, would have been already carried out.

Mr. SEELEY: Was not the technical difficulty arising out of your proposed outfall within the metropolitan district alluded to when you were before the First Commissioner of Works the other day? and was not an opinion then expressed that, if necessary, the obstacle could be got over by an act of Parliament?

Mr. BAZALGETTE: I think the First Commissioner did not express any opinion. The objection being mooted, he did not seem to deem it fatal. He asked the deputation to give a reason for having adopted that course, and it was given.

Deputy HARRISON said: In the engineer's report I meet with the following statement:—"Various considerations have arisen in the preparation of so vast a scheme, to which I have been unable to allude in my report, without inconveniently extending its length; but I beg to state that I have carefully considered all the principal points of difficulty which will have to be encountered in the execution of the works, and have satisfied myself as to the practicability of overcoming them; and I shall be enabled hereafter to give the board such further verbal explanations as may be required to elucidate the subject." I ask the board now to afford Mr. Bazalgette that opportunity.

Mr. BAZALGETTE, responding to the call of the board, pointed out on the map the limits of the metropolis, the drainage of which he deemed to be the object contemplated in the instructions given to him by the board—the portions of the district lying beyond to the east, although included in their jurisdiction, having no sewerage to convey away. Having determined by experiment that a discharge at Barking Creek at high water would be sufficient, his next consideration was the conveyance of the sewerage to that point in the most economical and satisfactory manner. It appeared that the larger portion of the district now before them was at a high level, and, it being practicable, it was very desirable to carry off as much of the sewerage as possible by gravitation, and thus save the cost of pumping. Taking it as a settled point that pumping was always to be avoided as much as possible, he had been enabled, by constructing two lines of sewerage, which he called his high-level and middle-level lines, to carry off, by gravitation, the sewerage of twenty-seven miles and a half at Barking Creek, which would never require pumping; and therefore, in this respect, would never be a permanent cost to posterity. The northern high-level sewer traversed the line of the Hackney Brook sewer, which, supposing no interception was provided, would have to be covered over. By adopting that line, he was enabled to drain a most important district, and to do away with a most objectionable open sewer. With regard to the low-level district, from which the sewerage could not be carried off by gravitation, he had endeavoured to keep his sewer as high as possible, securing, however, at the same time, facility for passing under docks, canals, &c., and for effectually intercepting all the sewers in its course. His object had been to save the cost of pumping, which was increased every foot the sewer was sunk deeper in the ground. Then the amount of sewerage to be carried off was another main point to determine. He first of all took the present actual quantity, which he had ascertained flowed at a greater rate during one part of the day than another, and must be provided for in estimating the necessary size of the sewers, or it would be backed up for a considerable period. He had also looked at the fact that London was rapidly increasing in size and in the number of its inhabitants; that they ought to hope for and expect a better water supply in the future than they had had in the past; and that any scheme which did not make provision for these increases was inefficient and defective. Then came the rainfall, after having made provision for all the other considerations. Although the average of rain was 27 inches in the year, it was not always regular. If it were regular day and night, then they might base their calculations upon it, which would give them something like the 800th part of an inch per day; but that would be practically useless, as every time it rained more water fell than that. After very careful trials, he had ascertained that the sewers which he had proposed would carry off a quantity equal to two inches in twenty-four hours. The high-level sewers had the advantage of better falls, and did their work more economically than the low-level; and by means of these three distinct lines, he was enabled to carry off much more water than if they were all combined in one low-level sewer. This was important to bear in mind in considering the question of cost, because by any scheme the expense would be diminished by lessening the size of the tunnels; but he submitted that scheme which did not provide for carrying off the quantity of water he had just indicated, would, at some time or other, fail to do its work effectually. Having dealt with the district as far as Kensington, by carrying the sewerage to Barking Creek, they had then to provide for a locality which was low in position and suburban in character, which could not be drained by gravitation, nor, advantageously, by the general low-level sewer. It would not be a judicious policy to increase the depth of the great low-level sewer in order to take in the small amount of sewerage from this district, because, for a comparatively small advantage, they would materially increase the cost of construction and the annual expense of pumping. Indeed, if hereafter it should be thought advisable to take the sewerage from the western district down to Barking, it would be the most economical to have a pumping station at Kensington, and pump the sewerage up into the general low-level sewer. The points of difficulty to which he had alluded in his report, were those which arose from the crossing of canals, railways, &c., which they would have to do in two or three places; but these were rather matters of detail than of principle.

In answer to questions by Messrs. Carpmael, Davis, Wright, Doulton, Ware, Leslie, D'Iffanger, Crellin, Few, Lyon, Hawkes, Dennis, Irvine, Wallis, Offor, and others,

Mr. BAZALGETTE said, that if the upper and middle level sewers were constructed first, it would greatly facilitate the completion of the low-level sewer, and at the same time divert a large quantity of the sewerage from the metropolis proper. The construction of the low-level sewer would necessarily interfere very much with the traffic in the main thoroughfares, such as the Strand, Fleet Street, &c.; but he thought there would not be any injury to the property on the route. He had made no calculation for constructing a sewer along the banks of the Thames; indeed, it would be impossible to do so without having seen a plan of the embankment itself. It would be very desirable to make the low-level sewer in conjunction with some plan for embanking the river between Vauxhall and London Bridges. There would be engineering difficulties in going beyond the latter point, and it would be necessary to tunnel from there. If the low-level sewer were not constructed on the banks of the river, it would be necessary to reverse the fall of all the minor sewers between the main line and the Thames, the cost of doing which was included in his estimate. Mr. Bazalgette proceeded to give his opinion on the comparative cost and effect of deodorising the sewerage waters of the western district, the effect upon the Thames of diverting from its volume through the metropolis so large a quantity of water, and other matters. He was under interrogation by the board for upwards of two hours.

Mr. CARPMAEL then moved, "That the report of the engineer, in so far as relates to the upper-level and middle-level sewers and their branches north of the Thames, be adopted." He thought that nothing could more satisfactorily show the propriety of making the division he had done that morning than the examination of the chief engineer which had just taken place, since he had been unable to find that any of the members objected to the upper and middle level sewers. There were many reasons why the board should at once agree to these two sewers—first, because they would discharge their contents by mere gravitation; and, secondly, because the state of the Thames would then be better than it had been within the memory of living man. With regard to the low-level sewer, two alternatives had been placed before them, viz.—first, whether the low-level sewer shall or shall not be constructed in conjunction with the embankment of the Thames; and, secondly, whether the sewerage of the western district shall be deodorised at the western district suburb of the metropolis, or conveyed through the low-level sewer to Barking Creek. In 1854, when Mr. Stephenson and Sir W. Cubitt were reporting upon this subject, they said:—"Of the three intercepting sewers comprehended in Messrs. Bazalgette and Haywood's plan, the construction of the upper and middle level should be proceeded with first; their completion alone will tend to cleanse the Thames of its impurities, and render the construction of the low-level sewer less costly and difficult." He would only add that, by executing these works, a very serious evil would be abolished—viz., Hackney Brook sewer—besides the relief that would be afforded to the Fleet sewer. As he had before remarked, no indication had been given of opposition to these two sewers, and he therefore moved his resolution with very great confidence.

Mr. FEW seconded the resolution, and quoted the opinion of Sir W. Cubitt on the plan of Messrs. Bazalgette and Haywood, which was substantially the

same as that now before the board. That eminent engineer had said, that the effect of this plan would be to "divert the sewerage of the metropolis as much as possible from entering the Thames till it was so far below London that the returning tide would not bring it back again."

Mr. Hows considered it was premature for the mover and seconder to suppose that no objections had been brought forward against the upper and middle level sewers. How could such objections be prominently brought forward before the discussion had been commenced? He would move, as an amendment, "That, before proceeding further with the engineer's scheme, the plan for the drainage of the north side of the Thames, submitted to the board by Messrs. Thornton and Jackson, and proposed to be carried out by them under the superintendence of the engineer, be submitted to some eminent impartial engineers for their report." It seemed to him that the recommendations of this scheme were very great; and it possessed, moreover, this very considerable advantage—that it was proposed by gentlemen who had more experience in deep tunnelling and cuttings than any of the present age. They were themselves willing to carry out their own proposal, certainly at a large cost; but, with regard to sewers, he thought the greatest efficiency was the truest economy. He supposed that for 100 guineas, or thereabouts, they could have this scheme, recommended, be it recollected, by Sir John Macneil, tested by eminent engineers. This scheme had a simplicity as well as a grandeur about which forcibly impressed him in its favour; and he apprehended that, on the whole, a good case had been made out for further inquiry.

Mr. Dennis seconded the amendment. He hoped the board would give these gentlemen a fair chance of having their plan thoroughly examined; and he was of opinion that the more it was looked into, the more it would be appreciated.

Mr. Leslie inquired of the chairman whether he would put an amendment which dealt with a plan whose outfall was within the limits of the metropolis? He apprehended that it was out of the power of the chairman to do so.

Mr. Few remarked that the same objection would apply to the scheme of the chief engineer.

Mr. Leslie: Of course; but first let us ascertain whether the amendment can be put.

The Chairman observed that it was quite clear that the board, who, after all, must be their own governors, had already determined by resolution that the point of discharge should be within the metropolitan district, in the case of the southern scheme. He could see no valid objection to the amendment being put.

Mr. Offor supported the motion, remarking that the vestry of Hackney, which had been formerly opposed to Mr. Bazalgette's plan for the northern drainage, were quite satisfied with the present one.

Mr. Davis gave his reasons for opposing the outfall proposed by the engineer; and said that, if the motion for adopting the high and middle level sewers stopped short of the outfall at Barking, he would support it.

Mr. Carpmael explained that the motion, if agreed to, would take the board no farther than the River Lea. Before determining the point of outfall, they must first settle the alternative as to the sewerage of the western district, whether they would carry the whole to Barking or deodorise the waters of that district, and run them into the Thames higher up the stream. In the former case, they would require their sewer to be of a larger dimension. In the engineer's plan, the first part only went to the Lea—the other was called the extension to Barking.

Mr. Davis thought there could be no objection to the scheme down to the River Lea; but, before deciding it, he would rather wait until the report from the Government as to the southern outfall were before them. In reference to the plan referred to in the amendment, he did not believe that any test of its efficiency could be obtained at the cost spoken of by Mr. Hows.

Deputy Harrison objected to the amendment, and ridiculed the idea of Mr. Hows wishing the scheme proposed in it to be submitted to engineers for consideration, when so recently as the 8th of February last he had opposed a motion by Major Lyon to do the same thing with all plans in the possession of the board. Having every confidence in the efficiency of the plan now before the board, he felt bound to support their own engineer.

Mr. Collinson coincided in the opinion expressed by Mr. Offor, that no time should be lost in deciding the question of the northern drainage. Respecting the amendment, he had to observe, that although he deemed it but fair that the plan propounded by Messrs. Thornton and Jackson should be examined into by the board, yet he thought that the plan ought to stand or fall upon its own merits before the board, and that it was undesirable to refer to engineers for their opinion. Whilst, however, he approved of Mr. Carpmael's motion, yet, seeing that there were only 21 members present, many having left under the conviction that no decision would take place upon the main question to-day, he desired an adjournment of the question, and would move it accordingly.

Mr. D'Ifpanger seconded the adjournment, which, however, on being put, was negatived.

Mr. Crellin said he was in favour of the motion of Mr. Carpmael, now that it had been defined as not carrying them further than the River Lea.

Mr. Hawkes ridiculed the notion of referring the plan of Mr. Thornton to engineers, and was decidedly of opinion that it was inexpedient to decide upon any portion of the engineer's plan before settling upon the outfall.

Mr. Bidgood was glad that Mr. Carpmael's motion carried them no further at present than the River Lea. In executing these two sewers the board would be only doing what would have to be done at some time or other.

Mr. D'Ifpanger thought that the board ought not to adopt a portion of any plan. If Mr. Bazalgette's scheme merited their approval, they should send it up to Government in its entirety.

The amendment of Mr. Hows was then put, but only three hands were held up in its favour.

Several members here urged the adjournment of the debate, but the suggestion was strenuously opposed, and

Mr. Savage deprecated the conduct of the majority in forcing on a decision in so thinly attended a board, and at so late an hour. He had himself a very important amendment to lay before them, on which he had intended to have made some observations, but would content himself by simply moving it. It was, "That no plan for the drainage of the metropolis north of the Thames can be deemed satisfactory by this board that proposes an outfall within the metropolis."

The Chairman decided that this amendment could not be put, inasmuch as the resolution before them, which formed the basis for the discussion, did not touch upon the question of outfall.

Mr. Savage: Then it ought to have done so.

A motion for adjournment by Mr. Hows was then rejected by 12 to 9, and another by Mr. Ware met with a similar fate.

The Chairman observed that, occupying the chair, it was his duty to see that justice was impartially administered to both parties; but it must be evident that the advocates for the postponement of the debate had the power of protracting the present state of things for another hour at least. Under these circumstances, it might be advisable for the supporters of Mr. Carpmael's motion to consider whether it would not be better to accede to the wishes of so many honourable members.

The debate was then adjourned to Tuesday, the 17th inst.

FRIDAY, JUNE 13.

The ordinary weekly meeting of the board was held this day at Guildhall—Mr. Thwaites in the chair.

The minutes were read and approved.

STREET IMPROVEMENTS.

Mr. Offor, in the absence of Mr. Moreland, introduced a deputation from the parish of St. Luke, Middlesex, to present a memorial from parochial officers and ratepayers of that parish against the proposed line of street through Bunhill Fields Burial Ground, and in favour of a grand eastern and western line, of which Old Street shall form a part. The memorial, which was signed by one churchwarden, the six overseers, thirty-five out of forty-eight vestrymen, and a large number of the ratepayers, set out at great length the objections felt to the proposed plan. The principal one was, that it was intended to pass over a spot consecrated for ages as the resting-place of many of the illustrious dead of our country. Among these, the memorial specially referred to the pious, learned, and amiable Owen, chaplain to the Protector, Oliver Cromwell, over whose tomb the road would be cut—to Bunyan, author of "The Pilgrim's Progress"—to Dr. Isaac Watts, and others, whose ashes repose in that cemetery, and whose memory is held sacred by many thousands in the metropolis, and, indeed, all over the world. There were also objections on the ground of expense, unproductiveness of return, and the damage done to property now contributing in just proportion to parochial rates. The memorial indicated that a more direct, open, and therefore desirable thoroughfare could be secured by continuing Old Street and Old Street Road. The cost of this would be comparatively trifling, as it would only necessitate the taking down of a few houses at the west end of the present line, and the setting back of the Charter House wall a few feet. This was a line recommended by the Metropolitan Improvement Commissioners as "the most convenient and most economical route which can be adopted to facilitate the north-western traffic of the metropolis."

The memorial having been received,

Mr. Offor moved that it be referred to the committee of public works and improvements.

Mr. Savage seconded the motion.

Deputy Harrison opposed the reference of this memorial to the committee, on the ground of its informality in alluding to a previous memorial that had been presented, but which had been referred back because it was informal, and was not, therefore, before the board.

Mr. Ware hoped the worthy deputy would waive his opposition, as he did not consider the objection raised was a sufficient ground for refusing to refer it to the works' committee.

Mr. T. H. Hall supported the motion, and it was carried by a large majority.

The board then proceeded to receive tenders for stationery and printing; to receive report on state of collections of district sewers' rates for the month of May, 1856; to allow deficiencies on district sewers' rates; and to order improvement rates to be made.

CLAIMS FOR COMPENSATION.

The following awards of compensation for loss of office, approved by the board on the 23rd of May, were confirmed, there being no appeals against them:—By vestry of Mile End Old Town, to Mr. Sadgrove, late clerk to the trustees for lighting, &c., Mile End Old Town. By vestry of Paddington, to Mr. Arrowsmith, late inspector of nuisances, Paddington. By vestry of Chelsea, to Mr. Jos. S. Eisdell, late clerk, surveyor, and collector to Hans Town Commissioners; to Mr. Thomas Long, late clerk to Chelsea Improvement Commissioners; and to Mr. Daniel Kirk, late messenger to Chelsea Improvement Commissioners.

FINANCE.

A report from the finance committee was brought up by Mr. Savage and read by the Clerk. It contained the following recommendations, which were severally moved by Mr. Savage and seconded by Mr. Miskin, viz:—

That the sum of £15,000 be removed from the deposit account and placed to the current account of the board. That the sums specified in the statement submitted to the committee, amounting in the whole to £8049. 5s. 10d., be paid. That a copy of the report by the accountant, containing suggestions for the keeping of accounts by vestries and district boards, be sent to each vestry and district board. That the committee be authorised to confer with the Government as to the best means of raising the funds necessary for the execution of the main intercepting drainage works of the metropolis.

Mr. Turner opposed the first recommendation, and contended that the board had no right whatever to touch one farthing of the £133,000 set apart specially for main intercepting sewerage purposes, which would be done if this resolution to draw the sum of £15,000 from the deposit was agreed to. He moved, as an amendment, "That the sum to be transferred be only £9522. 2s. 2d., being the actual amount for which cheques were required."

Mr. Hawkes seconded the amendment, and urged the board not to delay the making of a rate upon the several parishes and districts.

Major Lyon said he was glad to see an indication of the feeling of the board against this recommendation, and hoped it was the precursor of a sounder financial policy than they had hitherto adopted. He, though a member of the committee, must vote against the motion.

Deputy Harrison supported the proposition, and justified the committee in the course they recommended. The money in hand would be, in effect, borrowed until the difficulties connected with obtaining the necessary returns for making an assessment were surmounted, and would then be replaced for the purpose for which it was originally intended.

The Chairman explained that the delay, as it was called, in making a rate for the expenses of the board in the execution of the act, arose from the difficulty in obtaining the necessary returns as a basis for taxation. There were a number of extra-parochial places within their jurisdiction—liberties, as they were denominated—which paid no county rate; and, indeed, it was doubtful whether they paid any rate at all; and it was necessary to obtain some data upon which to go in reference to these localities, as they were liable for the purposes of the act.

The amendment was put and negatived, and the committee's recommendation adopted.

Mr. Savage said, in reference to that paragraph which authorised the committee to confer with the Government as to the best means of raising the funds necessary for the execution of the main intercepting drainage works of the metropolis, he would not at that moment enter into a discussion of the subject, because he thought it advisable that it should not be done in public. He would, therefore, simply move that the committee be authorised to confer with the Government.

Major Lyon seconded the motion.

Mr. Leslie expressed his dissatisfaction with these matters being carried

out by a finance committee. He was quite sure things must be badly managed in any board which delegated its powers to a finance committee.

The motion was carried.

STATE OF THE EFFRA SEWER.

Mr. T. H. HALL brought up a report from the works' committee, recommending, *inter alia*, "That 300 feet of Effra main sewer, near the police station at Brixton, be covered over, at an estimated cost of £1000." He moved that the report be adopted. It was a difficult subject to deal with, as the Effra would, when the intercepting sewerage works were completed, be completely dealt with; and this appeared a large sum of money to lay out in the *interim*. At the same time, as the committee, after looking carfully at the subject, had recommended that the work should be done, he felt bound to ask the board to agree to it.

Mr. DOULTON seconded the recommendation.

Mr. COLLINSON objected that the expenditure was not justified by the circumstances. He would not consent to this outlay of £1000 of the ratepayers' money for a mere temporary purpose.

Mr. DENNIS also opposed the motion. A similar application had been made from the parish of Islington with regard to the Hackney Brook sewer, which had been refused. Why should an open sewer in one district be covered over, and the same thing refused in another?

Mr. OFFOR and Mr. WALLIS opposed the motion, and Mr. BURSLEM and Mr. D'IFFANGER supported it.

Mr. CARPMAEL said he looked upon this as a very important question of principle. The board had 300 miles of open sewers under their control, and if they did it in one instance, they must do so in others—and were they prepared to cover the 300 miles of sewers? They had a large number of open sewers, and what he advised was, that they should cleanse them out well, and keep them as clean as possible till they could be dispensed with, and then fill them up forthwith.

Mr. T. H. HALL, in reply, said, the inhabitants of the district would of course have to pay for the covering of the Effra. If it were a side sewer they would do the work themselves; but, as it was a main sewer, the board must do it for them, and charge the district with the expense.

On a division, the motion was negatived by a majority of 15 to 14.

THE VICTORIA STREET SEWER.

A further recommendation of the works' committee was to the following effect:—

That the sum of £750 be tendered, without prejudice, to the trustees of the United Service Museum, in full satisfaction of all claims in respect of the damages, restorations, and works referred to in the report of Mr. Ambrose Poynter, dated the 30th of April, 1856, and report of the engineer to the board of the 27th of May, 1856.

On the motion of Mr. HALL, seconded by Mr. MISKIN, it was at once agreed to.

IMPROVEMENT OF HOLBORN HILL.

The committee of works also recommended,

That, before any steps for carying out the proposed improvements of the level of the Fleet Valley between Holborn Hill and Skinner Street, an application be made to the Government, in order to ascertain whether the Government can aid the board by providing a portion of the funds requisite to effect the improvement in question.

Mr. HALL, in moving this portion of the report, referred to the fact, that as the coal-tax did not expire till 1862, and that in all probability there was a great portion of that tax not likely to be appropriated, it would be advisable for the committee to have an interview with the Government, for the purpose of ascertaining whether any part would be likely to be available for this, which was admitted to be one of the greatest of metropolitan improvements.

Mr. WARE seconded the adoption of the recommendation.

Mr. LESLIE objected to the resolution, because the board knew nothing about what the plan was to be; and again he asked who was to pay it? The fact was, that the idea was to create two hills, and they were to be drawn into this scheme by the City people, to enable them to sell their lands in the neighbourhood of Victoria Street. It was no part of their duty to send a roaming committee to the Government or anywhere else upon this subject. Then there was a glimmer held out about the coal-tax, a subject upon which the people were exceedingly sore; and if that board fell into the trap about the coal-tax, they would get all the odium. He again asked how this money was to be raised, to carry out a plan which, if adopted, so far from being a benefit, would be a great monstrosity, and an abominable nuisance, and no use at all?

Mr. BURSLEM inquired where and by whom the account of the coal-tax was kept?

Mr. H. L. TAYLOR said, the coal-tax account was well and properly kept. To sit there and listen to the speech of his friend, Mr. Leslie, judging from his description of Holborn Hill, anybody would suppose that he had just arrived from Australia, instead of being an old inhabitant of the metropolis. It was a spot that required improvement more than any other in the metropolis; for it was a place that every man, woman, child, or horse complained of who had to go up Holborn Hill. He thought, so far from being condemned, that the committee had acted most judiciously in going to the Government to feel their way as to what amount of assistance they would be likely to afford in carrying out this most important improvement.

Mr. WRIGHT felt bound to oppose this motion. He objected to going to the Government to ask for any assistance from the Consolidated Fund. It would lower the dignity of that board, and of the metropolis which they represented, to go to the Government and ask them to take money out of the pockets of the people of Manchester or the peasantry of England for metropolitan improvements. And then, as to the coal-tax, there was nothing more objectionable to the people than this tax, which was levied on districts that derived no benefit from it; and he objected that they should go to the Government to ask for a continuance of that most obnoxious tax. He was quite prepared to vote for the improvement itself, and for the taxing of his district for their proportion of the cost.

Mr. D'IFFANGER thought there could not be a doubt as to the enormous nuisance of Holborn Hill; but, if there was any surplus arising from the coal-tax, he would rather see it expended on Hampstead Heath, and the whole metropolis taxed directly for this improvement.

Deputy HARRISON did not see how it could be said with propriety that the board were lowering themselves in asking the Government whether any help for this great improvement could be obtained from the coal-tax. That tax was created for, and its proceeds applicable only to, metropolitan improvements; and it was for the Government to say whether they would sanction any portion of it being devoted to this special work. The plan which he had seen for effecting the improvement was a very noble one, and it had been approved by the Government; but at that time the charges on the coal-tax would not allow of its being undertaken.

Mr. SEELEY said this was, like the question of Hampstead Heath, a most important one, but it was one upon which he most strenuously objected to going to the Government for aid. It was, no doubt, one of the most important and useful public improvements in this metropolis that Holborn Hill and the Fleet Valley should be levelled; but it was in reality a metropolitan improvement, and therefore the entire metropolis ought to be taxed for it, and not the country through the Government. If he (Mr. Seeley) had voted for going to the Government in the case of Hampstead Heath, it was in the hope that it would be met with a negative, and that it would settle the question of that board going and begging of the Government to grant aid in such cases, whether for drainage or improvements in the metropolis. He (Mr. Seeley) contended that they had no right to tax any other than the people of the metropolis. He now understood that a middle course was proposed, viz., to apply the coal-tax to that purpose. If there was any surplus from that fund, there could be but little objection; but he should certainly object to calling upon Government on any occasion to assist them. He opposed the motion.

Mr. TURNER objected to the adoption of the recommendation, as no plans were yet before the board.

Mr. WILKINSON approved of the report, and urged its adoption. The reference to the committee was to consider whether any and what alteration should be made in the level of Holborn Hill; and very properly the first step taken by them, after deciding that it was desirable to raise it, was to ask what help, if any, the Government were prepared to give towards it. In his opinion, London, being the great commercial centre of the country, there did not appear anything very inconsistent in taxing the nation for metropolitan improvements; and he would be even glad to see a grant from the Consolidated Fund towards the intercepting sewerage, as well as the new and enlarged thoroughfares so much needed.

Mr. DENNIS thought it would be ridiculous to go before the Government without some approximate estimate as to the cost of the proposed works.

Mr. DIXON supported the motion, and

Mr. BIDGOOD opposed it, on the ground that the board had no plans before them.

Mr. HOWS said he could conceive of no more beautiful picture than a complete plan for the raising of Holborn Hill, with a Government grant in the corner of £100,000.

Mr. BURSLEM said, no doubt the picture was a very pretty one; but he could assure the honourable member that he would find it a dissolving view.

Mr. HALL, in reply, denied that the committee proposed to ask the Government for one penny of money that was not their own; neither did he propose that they should ask the Government to continue the coal-tax one day beyond that prescribed—in 1862—for its discontinuance, but to claim that which they were entitled to. He urged that no further delay should take place in reference to the question, as very shortly the unoccupied ground at the bottom of the hill would be covered, and the now practicable improvement would be rendered utterly impossible.

The question was then put, when there appeared

For the motion	20
Against	6
Majority	— 14

MAP OF THE METROPOLIS.

The next recommendation of the committee was,

That the offer of Messrs. Day and Son for the preparation of a map of the area within the jurisdiction of the board, defining the boundaries of the various vestries and district boards, on a scale of six inches to a mile, on the terms set forth in their letter of the 28th of March, 1856, be accepted; and that, as a part of the arrangement proposed, the board do order 200 copies of such map, at a cost of £450, being at the rate of £2. 5s. per map.

After a short conversation, the motion to adopt the same was negatived.

NEW STREET FROM CRANBOURNE STREET TO LEICESTER SQUARE.

The last recommendation of the committee of works was on the reference of the memorials of the parish of St. Paul, Covent Garden, and the Board of Works for the Strand district. It was to the following effect:—

That the subject of the formation of a new street between Cranbourne Street, Leicester Square, and King Street, Covent Garden, referred to in the memorials from the Strand District Board of Works and the Vestry of St. Paul, Covent Garden, be referred to the superintending architect for consideration and report, and that he be instructed to prepare a plan and estimate for such improvement.

After some conversation the report, with the last clause ommitted, was adopted.

THE TIDAL FLOAT TEST.

Mr. BAZALGETTE said, on the previous Tuesday he saw Captain Burstal, the gentleman appointed by the Government to test the tidal observations, and handed over to him the experiments which had been made with the float. He had seen Captain Burstal again that day, and that gentleman informed him that he had carefully examined those tests, that he found them very elaborate and full, that his experience for many years past entirely confirmed them, and that he had no doubt of their accuracy. He therefore proposed to test them generally, for two days at neap-tide, and two days at spring-tide, and it was now for the board to determine whether or not they would appoint any one to accompany him in his observations. In his (Mr. Bazalgette's) opinion, the matter might very safely be left with Captain Burstal.

Mr. DREW was fearful that that course might lead to delay.

Mr. BAZALGETTE said he believed not. The days which would most likely be selected would be the 18th and 19th, and the 25th and 26th, of the present month.

Mr. LESLIE thought that, if it would not be considered disrespectful to the Government, the matter should be left with Captain Burstal. If the board appointed any one it should be Mr. Phillips.

Mr. WRIGHT said, on this subject he would submit the following motion:—

That this board having the highest opinion of the ability of Captain Burstal, who has been appointed by the Government to test the experiments of the tidal flow, and the effect of discharging sewerage at different states of the tide, at Barking and Plumstead, have much pleasure in leaving the matter in his hands.

Mr. BAZALGETTE said that Captain Burstal had informed him that Sir Benjamin Hall was of opinion it was a matter for this board to act in entirely as they thought best.

Mr. HALL moved that Mr. Bazalgette be appointed to meet Captain Burstal on the occasion.

Mr. COLLINSON seconded the motion, which was agreed to.

NEW DISTRICT SEWERS.

The ENGINEER reported in favour of applications from vestries and district boards to construct sewers in St. Mary Abbot's (Kensington) parish—Campden Hill Road, Kensington Road; St. Mary's (Newington, Surrey) parish—Paragon Place, Field Place, Newington; St. Mary's (Islington) parish—intended new street north of Grove Road, Holloway; Bermondsey parish—South Place, Upper Grange Road; and on defective junctions formed with main sewers by the district board of Greenwich.

The necessary orders were made, in accordance with the engineer's recommendation.

The cash account presented showed a total general balance of £147,113.16s.7d.

The board then adjourned.

TUESDAY, JUNE 17.

A Special Meeting of the Board was held this day in No. 1 Committee Room, Guildhall, for the purpose of resuming the discussion on the northern drainage. Mr. THWAITES took the chair at twelve o'clock.

THE ENGINEER'S REPORT ON THE MAIN DRAINAGE OF THE NORTHERN DISTRICTS.

Mr. WARE, in resuming the debate, said he was extremely glad that this discussion had been postponed till to-day, inasmuch as it afforded those members who had gone away early on the last occasion, under a conviction that there would would be no division on the main question, an opportunity for expressing their opinion, and of recording their vote. After giving the best attention to the question that was in his power, he felt bound to support the motion before the board. He regretted that it should have gone abroad that in this important matter any unnecessary delay was taking place. The principles to be settled were so vital, and the interests involved so momentous, that the board were warranted in giving to the whole question their deliberate and most matured judgment.

Mr. LESLIE did not conceive that any apology was necessary for the course which had been adopted, nor did he believe that the time had yet arrived for expressing any opinion upon the engineer's report, as they had not settled the point of where the sewerage was to go. This he looked upon as a matter involving the whole value of the plan; and, until it was determined, he considered it would be folly to waste three or four hours in discussing any minor matters, whether of principle or detail. To bring the question to an issue, he would move, as an amendment,

That it is inexpedient to discuss the engineer's northern drainage plan in sections, as the decision upon the outlet is undetermined; the basis of the whole of the calculations and the efficiency of the whole scheme depending upon the outlet.

The board had already agreed to a plan for the southern drainage, which proposed an outlet within the metropolitan district; and they had forwarded that plan to the Government for their approval. But, even supposing that Sir Benjamin Hall, acting for the Government, should be inclined to agree with the board in their decision, there were other parties to be considered in the matter, and very important ones too—viz., those who would be called upon to lend the money for carrying out these works. The legal advisers of these parties would, as in duty bound, see to it that their clients did not advance money for the execution of works not contemplated by, or in accordance with, the terms of the act of Parliament under which it was sought to borrow. Therefore, unless the board could get their act altered, of which there was not the slightest chance, they would have to go much further down the river, and their engineer would have to make a very different plan to that which was now before them.

Mr. DOULTON seconded the amendment.

Mr. DENNIS inquired of Mr. Bazalgette whether he had understood him to say, that in the event of the Government requiring them to go much lower down the river, it would not be possible to carry out the low-level sewer without the aid of a syphon?

Mr. BAZALGETTE said that what he stated was, that he had no means of carrying the main drainage down without a syphon.

Mr. DENNIS: Would there be much difficulty, should such an event occur, in lowering the sewer for a considerable distance before reaching the Lea, so as to avoid a syphon?

Mr. BAZALGETTE: Just this difficulty, that every foot lower you carry your sewer, the greater pumping power you will require. In this case you would have to pump it at an enormous expenditure of power and money; and it would be even better to have a syphon than to incur this cost. Of course anything can be done; the question is, what is best to be done?

Mr. DENNIS: Do you think it would not be a prudent step to adopt?

Mr. BAZALGETTE: I say that it would be impossible to take advantage of the levels which I have indicated, and to get a powerful discharge beyond Barking Creek, without an extraordinary increase in pumping throughout the entire metropolis.

Mr. DENNIS: Then it would disarrange your plans altogether?

Mr. BAZALGETTE: To carry it below Barking Creek would, as I have said, involve the necessity of a syphon, which, to my mind, is an objectionable thing. It would not disarrange the works west of that point. If we are to go on, I think it would be better to incur the inconvenience of a syphon, and still avail myself of the levels I am able to obtain, than to abandon those levels, and carry the sewerage lower in the ground, with the absolute necessity of having to pump the whole up again.

Mr. DAVIS said he gathered from the statements made by the engineer that this was the best scheme that he could propound. He would like to ask him whether, supposing the board had directed him to carry the sewerage down to Thames Haven, he would, apart from the increased cost of the works, have deemed that a more objectionable point.

Mr. BAZALGETTE, in reply, said he was of opinion that he could not have produced so perfect a scheme as that now before the board. There would be no insurmountable difficulties in the way, but there would have been the necessity for a syphon.

Mr. CORRIE referred to page 14 of the engineer's report, where he stated that, while again submitting "the plans and estimates for a low-level sewer, independent of a design for the embankment of the Thames, I beg to state that a large amount of risk and capital may be saved by executing the low-level sewer in conjunction with an embankment along the north side of the Thames; and that the execution of both these works is essential to the full attainment of the object desired. It would therefore, in my judgment, be desirable so to arrange the execution of this line of sewer as to enable it to be constructed conjointly with the Thames embankment." He wished now to ask whether, apart from monetary considerations, the engineer could not propose a better and more perfect scheme if he adopted the line of the river, and did not interfere with the existing sewers down to that point?

Mr. BAZALGETTE said, with respect to the ultimate working of the scheme, it was perfectly immaterial whether the low-level sewer were carried along the Strand or on the banks of the river; but, as far as the construction of the works were concerned, the latter would be, undoubtedly, the most convenient course.

Mr. LESLIE: Do you, as an engineer, mean to tell this board that a plan of Thames embankment will at all facilitate your making the main intercepting sewers?

Mr. BAZALGETTE: Undoubtedly I do.

Mr. LESLIE: Have this board the power to make a Thames embankment?

The CHAIRMAN: That is not an engineering question.

The amendment was then put, and negatived by a majority of 7.

On the motion being put,

Mr. DOULTON wished he could bring his mind to the happy condition of most of the members of the board on this subject, and could believe with them that the plan under discussion was both safe and practicable. He entertained objections to it very similar in character to those which applied to the southern drainage; but, as he had already had the opportunity of laying before the board his views when that matter was before them, he would not now go over the ground again. There was, however, one objection to it which had been forcibly dwelt on by Mr. Leslie, and which he (Mr. Doulton) thought was fatal to the whole scheme, and that was in reference to the point of outfall. Although this had been urged again and again as a reason why they should pause in the course they were taking, he felt bound once more to protest against it. The scheme did not even pretend to conform to the requirements of the act of Parliament under which the board sat, and which act imperatively called upon them not only to divert the sewerage from the Thames in its passage through London, but from flowing or returning into the river in or near the metropolis. Another objection he had was the piecemeal way in which they were dealing with the question. He would ask the honourable member for Wandsworth whether it was intended to take it up to the Government in this manner? If so, they would only get laughed at for their pains. If it was not their intention thus to deal with it, then, he would ask, where was the utility of pressing on a division upon this part of the scheme? The metropolis ought to be be dealt with as a whole, and a comprehensive view taken of the entire scheme. The engineer had, as he (Mr. Doulton) conceived, very properly placed certain difficulties before the board; and what he complained of was, that they did not sufficiently consider the alternative propositions. Mr. Carpmael asked them to agree with the report in reference to the upper and middle level sewers, leaving the low-level untouched; and why? Simply because certain difficulties presented themselves. He admitted that they were difficulties; but surely it behoved the board to face them at once, and to deal with them. He was exceedingly pleased with that portion of the report which proposed an alternative for the western district of the metropolis. There was an opinion out of doors that the board ought to have looked at this point more carefully in debating the drainage scheme of the south side, and that it was most important that it should be first disposed of before the other parts were touched. Entertaining as he did, for the present plan, a decided preference to the southern scheme, he yet could not consent to vote for it until the difficulties to which he had alluded were dealt with.

Mr. CARPMAEL, in reply, said his reason for asking the board to deal first with the upper and middle level sewers was, that these two were distinct and separate works, and must be executed, whatever might be done with the lower parts of the district, or with the question of outfall. As to whether this part of the scheme should go up to the Government before the others were decided upon, it was not for him to say—the board would deal with it in their discretion; but he would just state that, as soon as this question was disposed of, he would bring on in succession the various other parts of the plan without any delay.

The motion was then put, and declared to be carried.

A division having been demanded, the numbers were—

For the motion	17
Against	9
Majority	— 8

Mr. CARPMAEL said, in rising to propose the next resolution, he had some confidence that Mr. Doulton himself would second it, when he had briefly explained his views to the board. Their engineer had placed before them an alternative in reference to the drainage of the western district; and, without first settling that alternative one way or the other, they would not be able to decide upon the question of the low-level sewer, the extension to Barking Creek, or the ultimate outfall. If the board accepted one alternative —viz., that of pumping all the sewerage from the western district to the outfall—the whole of the low-level sewer would have to be constructed on a much larger scale; the reservoir and the extension line must also be of a size commensurate with the increased requirements. The other alternative which the engineer had suggested was this: he said, that the western district, which included a very large area, although connected with the other parts of the metropolis north of the Thames, was entirely independent of them, by reason of its being at so low a level that it could not be drained and sewered without pumping into the general low-level sewer, which received the sewerage of the lowest parts of the other portion of the north side. He therefore suggested that, by dealing with the western sewerage by means of deodorising works, the board could in the first outlay save £250,000; and that the annual cost of pumping, amounting to about £6000, might also be economised, which sums would have to be set against the cost of maintaining and conducting the deodorising works, but not the expense of erecting the same, which was estimated at £90,000. At an earlier period of the discussion on the main drainage and intercepting sewerage of the metropolis, he (Mr. Carpmael) had ventured to give to the board the result of his experience in reference to sewerage manure and sewerage manure works. That experience had not been a very limited one, inasmuch as he had been personally consulted by every party who had proposed a plan for the purpose. At that time he stated to the board that he had no hope, from their present knowledge, that they would be able to obtain any return for the sewerage manure, supposing they should ultimately resolve to establish deodorising works. He was still of the same opinion, but had not contented himself with his previous information on the subject.

Mr. LESLIE thought the honourable member, before proceeding with his speech, ought to tell the board what motion he intended to submit.

The CHAIRMAN said that was a matter quite in the discretion of the honourable member, though, no doubt, it would be the most convenient course.

Mr. CARPMAEL had not the slightest objection to state the terms of his motion. He had told the board that there were two alternatives placed before them, and it was for them to receive or reject either, as they thought best. He intended to select one of those alternatives, and present it to the board for the purpose of eliciting an expression of opinion; and, as he believed that both propositions were good, he would be quite content with whichever the board adopted. He would move—

That the report of the engineer, so far as it relates to the western district and the construction of deodorising works, be adopted.

He had already informed the board, that if the other plan were adopted, even though the sewerage was not carried lower than Barking Creek, the whole of their sewers must be constructed of a larger dimension, so as to accommodate the requirements of the western district. Since the report of the engineer was brought up, he had felt it his duty, having the opportunity of doing so, to inform himself of the practical operation of one of the largest deodorising works in the country. Accordingly, he had been down to Leicester to investigate the works there; and in his researches he had had the advantage of the presence of the engineer, and the chairman, Mr. Cook, who devoted the previous Saturday week to his accommodation. When, therefore, he told the board that the result of his investigations had produced no change in his views in reference to the productiveness of sewerage manure, and that in his former calculations of the expenses attending deodorising works he had not included the cost of conveying the material away, they would feel that, although he considered it his duty to submit this resolution, he was by no means the advocate of sewerage manure. But he was bound not only to look at the present position of scientific knowledge, but at the future possibilities. Up to the present time he was satisfied, in his own mind, that they could

not make manure, of a mercantile value, from the sewerage of the metropolis; he did not say they never would. During the present week he had had an opportunity of consulting with four of the most eminent chemists in the kingdom, who had been appointed to make certain investigations by the Government and the water companies, and, having gone through the matter very carefully, he felt confidence in laying his views before the board. As he had said, he went to Leicester to examine the works. He found them dealing with the sewerage of a population of 65,000, and ascertained that they had been fully and completely at work for 18 or 20 months, and partially so for the last three years. Therefore it might be considered as an established work, by which the sewerage of Leicester was being constantly dealt with day and night. As an illustration of the effects which they had produced upon the waters of the river, he might mention that a short time ago an old inhabitant of the town was noticed to be carefully looking into the waters near to the works. On being asked what he was looking at, he said, "I am looking at the bottom of the river; I had not seen it before for 30 years." The board would from this little circumstance be able to judge of the state in which the waters were delivered after deodorisation into the stream. He would now shortly tell them the practice adopted at these works. They used lime for the purpose of precipitating and deodorising the whole of the animal and vegetable matter that came down with the sewerage. The main sewer from Leicester was conducted out of the town about a mile and a half, and was carried at the back of some large works belonging to a friend of his. This large sewer was led into a building where there was a well, and the sewerage being received into that well, was pumped up continuously by means of steam-engines. This pump was of large capacity; and a smaller one, worked by the same engine, pumped up at the same moment a small quantity of lime-water, rather in excess, and these two materials were passed into a closed chamber, where they were intimately mixed and stirred together. The chamber was so securely closed, that, although you were aware that large quantities of the most offensive matter were perpetually passing into it, you were not conscious by any smell that the receptacle was immediately under your feet. So soon as the lime was well mixed it went into a second chamber, where it was again routed up, and thence it flowed into one side of a large reservoir. Each particle of water that came into the reservoir so mixed at one end, displaced an equal quantity at the other end, which passed out of the reservoir perfectly clear. The water, from the time it went in till it passed out of the reservoir (which reservoir was completely covered in, so that there was no smell), was detained about two hours; and at the outfall it poured forth perfectly clear, perfectly odourless, and was, in fact, clean water. Therefore, looked at in a sanitary point of view, the works might be said to be in the highest state of efficiency. But, upon calculating the cost of dealing with that matter—even though the lime be used for sanitary purposes—he was not prepared to say that, in its present state, unless something additional could be done, any farmers would fetch away the manure, if permitted. There were thousands of tons lying at Leicester in heaps, and not fetched away. There was certainly this advantage in his going there as he did, and finding a large quantity of this solid manure in heaps about the place—that he was able to prove its inoffensive character. He happened to go upon a very hot sunny day, immediately after a heavy rain, and he could assure the board that outside of the premises, except from previous knowledge, it would have been impossible to tell the description of manufacture carried on within. What, therefore, he wished to urge with the board from these considerations was, that it would be wise to adopt the alternative now before them, inasmuch as they would otherwise have to pay £250,000 more for constructing the low-level sewer, the extension sewer, and the reservoir, and still more if it was ultimately determined to carry the sewerage further down the river. It appeared to him that this was an advantageous opportunity to deal with this subject, because it could be done comparatively inexpensively. There were Richmond, Kingston, Croydon, Oxford, and many other towns lower down the country, on the banks of the Thames, which required to be drained.

Mr. LESLIE: We have nothing to do with them; they are not in our act.

Mr. CARPMAEL: True; but it was the duty of the board to make the Thames as pure as possible; and he contended that they would never effectually and completely do this until, by their action, they had shown to those towns which were so circumstanced that they could not take their sewerage to Barking Creek, what might be done to deodorise and render it harmless. If the alternative now before them would involve the metropolis in greater expense, or if the board were deluding themselves with the idea that they should derive any money returns for the sewerage manure, he would oppose the scheme most energetically; but when he was told that it would cost £250,000 more to make the works necessary for the other alternative—when he knew from his own judgment and observation that he was dealing with the subject in a way which, should chemical research discover a mode of rendering the sewerage commercially valuable hereafter, they would be able to take advantage of it at once, and without a shilling additional outlay—he had confidence in submitting this motion to the board. He had, as he supposed other members also had, recently received a circular from Mr. Stoddart, and he knew the system which that gentleman propounded. If the works which their engineer proposed for the western district were now in existence, they could at once determine whether Mr. Stoddart's plan was preferable to the use of lime. Then there was Mr. Dover, who had another scheme, which, however, he did not approve, but which would still be open to be tried; and he therefore said it was highly desirable there should be such works in existence. Whether in their wisdom the board would accept this proposition or not, he could not predict; but, whichever course they adopted, he would be perfectly satisfied. He believed both plans were good, but he recommended this one in preference for the reasons he had given.

Major LYON seconded the proposition for the purpose of bringing it before the board, though he could not speak with that confidence which an intimate knowledge of the facts enabled the honourable mover to do. The matter had been so thoroughly expounded by Mr. Carpmael, that it was only necessary for him (Major Lyon) to say that he seconded the motion, reserving to himself the right to put any questions hereafter.

Mr. LESLIE confessed that he was perfectly astonished at the proposition. It was, that the board should not make any sewers at all, but that they should deodorise the sewerage, and send it into the Thames contrary to the provisions of the act of Parliament, and in spite of the resolution they had already come to in reference to the upper and middle level districts. He warned the board that, unless they were careless of making shipwreck of their position and character, they must adhere to the statute, and not wander out of the record in such an absurd way. The mover of the resolution informed them that he had been down to Leicester, and had done what? why, ascertained that the sewerage works there were not remunerative; and then he amused them with a story of an old man who, not having seen the bottom of the river for thirty years, was caught in the act of gazing with delight at the wonders which these sewerage works had effected. Why, was it to be tolerated that a public board would allow itself to be engaged with such stories as these, or of that of the eminent chemists to whom the mover had referred? He (Mr. Leslie) believed that Mr. Bazalgette's scheme was worthy of every consideration, but he did not believe in the mode of treatment here proposed, especially when he gathered from a return which had been sent to him, that even at Leicester, where the sewerage manure works were carried on with every advantage, they found that they had to pass upwards of 11,000 tons of sewerage water through lime in order to get one ton of the manure, which, according to Mr. Carpmael's accounts, although perfectly odourless, was utterly unsaleable, and was lying in great heaps. If it had not been for the extreme good-nature of his excellent colleague (Major Lyon), this proposition, being unseconded, would have fallen to the ground; and even now he felt convinced it was certain to be defeated. How any one could seriously propose to the Metropolitan Board of Works, in the year 1856, to plant deoderising sewerage manure works in the neighbourhood of Kensington, he was absolutely at a loss to conceive; but he was quite sure the honourable member for the district would not let the proposition quietly pass by. Under their act of Parliament they were authorised to borrow money for works which were not a nuisance; but did they believe for a moment that any one would lend them a penny to establish sewerage manure works? If they wanted to see how the thing worked, let them go to Stanley Bridge, where, though thousands of pounds had been expended, there had been no return. He called upon the board to make short work of this proposition, and to let his friend, the attorney-general for the engineer's plan, go on with his other proposition. He earnestly hoped that, representing as they did, for the purposes of the act, large and important communities, they would never allow themselves to enter into any scheme of this kind. If sewerage manure was valuable, or should hereafter be made so, let it be done by commercial enterprise, and let the collecting and deodorising it be carried on at the outfall, where land would be cheap, and facilities would exist for conveying it away.

Mr. HOWS said that, since the former debate on this point, he had been to the works at Tottenham, which, though not upon so large a scale as those at Leicester, were sufficiently comprehensive to enable him to form a judgment as to how the experiment had succeeded. In this case the sewerage of a population of about 10,000 was removed, and dealt with under precisely the same circumstances as those mentioned by Mr. Carpmael; and he must at once acknowledge that on arriving at the spot he was agreeably disappointed, for he had certainly expected to find a very offensive smell proceeding from the works. Not content with what he saw of the mode of conducting the works, he thought it best to bring away a specimen, not of the grapes of Eschol, but of the bricks into which the solid manure was converted. As he had said, he was both surprised and delighted with the working of the establishment. He saw the foul water pass into the place, which, according to Mr. Higgs's account, probably about half an hour before was in the closets of the inhabitants, and pass out again almost immediately in a perfectly pure state. Having said this much, he felt bound to oppose the motion, because he thought that it went much too far. If one such work as this was to be tolerated, it followed, as a matter of course, that other works of a similar character would be equally advantageous; and therefore that the whole scheme, the very idea of intercepting sewerage, was wholly unnecessary. The sewerage manure, as it was called, was, when in a soft state, made up into bricks, and dried in the sun, or by some heating apparatus, and then offered for sale. One company (the one whose works he visited) asked four guineas per ton for it, and he understood that at Leicester they were advertising it at 45s. On inquiring whether much had been sold, he was told, very little, but the company offered to send a few tons to any farmer who liked to try it as an experiment. Having carefully examined these works, he for one was not prepared to recommend the board to enter upon the establishment of a deodorising apparatus, which was a matter that fairly and properly belonged to commercial enterprise to undertake. At the same time, they all felt it was a pity to throw into the Thames millions of tons of that which, by many people, was said to have a mercantile value; and therefore it was that he regretted they had not adopted the proposal to offer premiums for essays on the best mode of treating this material. As they had not done so, he had nothing more to say, except that he felt they would be doing their duty to the ratepayers of the metropolis, and at the same time facilitating commercial enterprise, should it ever take this direction, if they conveyed the sewerage to one point below London, instead of leaving it at deodorising works at two or three places within the metropolis. It would be far better to expend the £250,000 in enlarging the low-level sewer and the extension line to Barking, and thus comply with what the act of Parliament required of them, than to incur the cost of erecting and maintaining works from which they could get no return. Let the board remember that, if the low-level sewer were built, and the deodorising works at Kensington—which were to cost £90,000—should prove a failure, they would have all their work to do over again, at a fearfully enlarged expenditure. And he would ask them further to consider whether, if by the act of Parliament they were not allowed to cast liquid manure into the river, they were justified in storing a large quantity of solid manure upon the banks, where it would be a greater nuisance than any which the metropolis had now to complain of.

Mr. WRIGHT said the honourable gentleman who had moved the resolution had put the board in a difficulty, inasmuch as they had no information to deal with. He himself, on the last occasion, had put some questions to the engineer, who admitted that he was wholly unacquainted, from personal experience, with the subject. Mr. Bazalgette had taken his information from Mr. Wicksteed, and was not prepared to say how much lime was required to be mixed with the sewerage waters to effect the deodorisation and precipitation. He (Mr. Wright) was quite of opinion that there was a limit beyond which it was impolitic to build sewers passing through a large city like London; and that the sewers might not only be too great, but the pumping expenses so enormous, that it would be well, if possible, to resort to some other method of getting rid of the refuse of the population. But still, for his own part, he wanted information on the subject, and probably, if he could put Mr. Carpmael into the witness-box, he could obtain so much as would secure his vote on this occasion. It was clear to him that in the brick which Mr. Hows had produced there was an enormous quantity of lime; but what he wanted to know before he could accede to the proposition before them was, how much lime was required for absorbing a given quantity of sewerage water; what would be the expense of purchasing land for storing it—say for 20 years—if not sold, and then adding this to the facts now before them as to the cost of erecting the works and the actual expenses of conducting them, he would be able to form some more definite idea as to the propriety of the course recommended. At present they were without any data upon which to form a judgment. If they were to save £250,000, that was one argument; but there was no estimate of the expenses of the other scheme. He felt that it would be better for the board to reject this proposal—at all events, for the present; and, if they erred at all, to err on the safe side, by making the sewers large enough to take the drainage of the western district down to the outlet. He differed with great hesitancy from the opinion expressed by Mr. Bazalgette, as he did not profess to be an engineer; but, if there was one alteration in the plans before them which he certainly would like to see made, it was

an enlargement of all the sewers on the proposed size. He would not give a decided and final negative to the question of sewerage manure works, because by and by proofs might come before them which would alter their present opinion; but, in the mean time, it would be better, by rejecting the motion now, to say that it was not expedient, with their present knowledge and information, to carry them out. He believed that the other alternative presented decided and permanent advantages, and therefore should vote for it. If he felt that the board were in danger of accepting the proposition now before them, there were several other matters which he would urge upon their attention; but, as he believed they would negative it, he would not occupy their time. The western area was the most thinly populated district of any part of London, and therefore any sewerage works there would be mere moonshine. There were not more than seven thousand inhabitants to the mile; and, if the whole of the sewerage waters went into the Thames, it would not be of much consequence; and even the success of deodorising works would be no test of their practical value in the case of more important and densely populated places. In the course of two or three years, it was probable they would have some scheme brought forward for accomplishing the deodorisation and preparation of sewerage manure in a better and more economical manner; but till then let them proceed with the great work set before them, of intercepting this refuse from the Thames, and getting it out of the metropolis.

Mr. HAWKES said, the act of Parliament required the board to prepare works for preventing the sewerage from passing into the Thames within the metropolis, and yet, in the face of that requirement, they were gravely deliberating a plan by which the sewerage of one-third of the northern district was to pass into the stream in the western part of the town. He could not imagine how their engineer could place such an alternative before them, or how the board could entertain it for a moment. This was a matter on which not only their own judgments but the opinions of their constituents ought to be consulted; and, that he might act rightly in the matter, he had obtained the opinion of the inhabitants of Kensington for his guidance. The following resolution had been unanimously agreed to by them:—"Resolved, that in case the plan of Mr. Bazalgette is adopted by the Metropolitan Board of Works, this vestry objects to the reservoirs for deodorising the sewerage manure in Fulham Fields, and to the outlet so near to the metropolis as Barking Creek; and begs to express its preference to the Thames embankment to the sewer in Fleet Street." It would be thus seen, that while his constituents spoke respectfully, they spoke firmly; and he hoped that the board would meet their views by not placing within their district a most abominable nuisance for the mere sake of saving expense. The inhabitants of Kensington had no idea of the kind of justice which would call upon them to meet their part of the expense of sewering the metropolis, and yet they not be allowed to share in the advantages which every other part would enjoy. They asked the board in fairness to carry out the act of Parliament, and do for them as they would do for the rest of the districts. Many years ago the banks of the river were polluted with the decaying carcases of criminals exposed on gibbets, but the growing intelligence of the age had put down that abomination; and he earnestly hoped that what must be considered as great, if not a greater, nuisance, would not be perpetuated at the present day, but that the good sense of the board would lead them at once to reject the motion now before them.

Mr. DENNIS could not consent to give a silent vote on a motion by which it was proposed that the board should set up in business for themselves at a large expense, which, in the event of failure, would entail heavy loss upon their constituents. But the evil would not be in the amount of money sunk in the deodorising works alone; they would have to enlarge their sewers, or build fresh ones by the side of them all the way to the outfall. Then, as to the value of the stuff when deodorised. He believed that, if they gave it away, no farmer who had five miles to carry it would deem it worth his while to have it. Supposing they could not sell it—as he was convinced they could not—let them ask themselves what they were to do with the enormous deposit that must take place. He had ascertained that the cost of removing it to the nearest possible spot down the river, where it could be left, would be £3 per barge load of fifty tons. From what he could see of the material itself, it appeared that it required to be mixed with one-half the quantity of lime, and this would render it pretty nearly valueless as a manure. In order to deodorise the immense quantity of sewerage water, they would have to enter into contracts with the largest lime dealers in the country to supply them with this article, to manufacture that which, when it was prepared, would be good for nothing. Let the board reject this proposition, and expend the money intended to be spent in building these works in making their main sewers of such a size that they would take the whole of the refuse from every part of the metropolitan district. If deodorising works were afterwards thought desirable or likely to be profitable, let them be carried on at the outfall, and let those who required the liquid sewerage lay down iron pipes to convey it from the works to their own premises.

Mr. BURSLEM hoped that, if this motion were rejected, the building of the sewers of a larger size would be a matter of course. It appeared to him that Mr. Bazalgette had only proposed this alternative as a point of duty, believing it would, if adopted, save expense, and not that he had any idea of entering upon any mercantile speculation with it. He thought, if they could do nothing else with the kind of bricks produced, they might build houses with them. (Laughter.) He intended to vote against Mr. Carpmael on the present occasion, because he would rather have the larger sized sewers.

Mr. DAVIS was clearly of opinion that it was mere waste of time to discuss this subject, and hoped the motion would be rejected. He was glad, however, that the question had been introduced, because it had excited for the inhabitants of Kensington, who were threatened with the infliction of these works, a sympathy, which he hoped to be able to enlist on behalf of Plumstead and Woolwich in reference to the outfall.

Mr. CARPMAEL briefly replied, and reiterated his former statement, that of the two alternatives he believed this to be the best, but he would be quite satisfied even if it was rejected.

The motion was then put to a show of hands, and declared to be lost.

A division being demanded, the numbers were—

Against the motion	20
For it	4
Majority	— 16

Mr. CARPMAEL then proposed—

That the report of the engineer, so far as it relates to the western district, and the construction of works for pumping the sewerage and rain water into the low-level sewers, be adopted.

Mr. WRIGHT briefly seconded the motion.

At the suggestion of Mr. LESLIE, that portion of the engineer's report was read.

Mr. LESLIE said he most decidedly objected to this mode of proceeding, and would re-move the amendment which he had previously submitted.

The CHAIRMAN ruled that it was not competent to the honourable member to take that course.

Mr. HAWKES moved, as an amendment—"That the board now proceed to the consideration of the outfall."

Mr. D'IFFANGER seconded the amendment.

The question was then put, when there appeared—

Against the amendment	22
For it	8
Majority against	— 14
For the motion	18
Against it	5
Majority for	— 13

Mr. CARPMAEL said, having carried the upper, middle, and western district plans, he felt that they were unincumbered in coming now to the question of outfall. He therefore proposed—

That the report of the engineer, so far as it relates to the extension to Barking Creek, be adopted.

He did not believe, with Mr. Leslie, that this proposal was in the teeth of the Metropolitan Local Management Act; but, even if the terms of the clause upon which the honourable member depended were as absolute as he would make them, he would still feel it to be his duty to submit this plan, which was the best in an engineering point of view, and leave it with the Legislature, on the facts being laid before them by the representatives of the ratepayers, to make such alterations in the law as would enable them to carry it out. It could not be doubted for a moment that Parliament was not desirous to tax the inhabitants of the metropolis unnecessarily, by calling on them to carry out works which were larger or more extensive than was required for the purpose, and that they would not be backward in supporting any plan which proposed to do it in the most efficient manner. He believed that he could show the board that what they did on the south side of the river was wise and prudent. They had been told that the Government had set their ban upon it, and had resolved that it should not be carried into effect. But did the conduct of the Government bear out that view of the case? Had they not set their own officer to investigate the question, and were they not now seeking to ascertain where was the best place to let the sewerage out into the Thames? He believed that they were as desirous as the board was to do all that was necessary, and would not sanction, much less compel, the board to spend hundreds of thousands of pounds in carrying the refuse further, unless there was an absolute necessity for it. This he was fully satisfied of from the manner in which Sir Benjamin Hall received the deputation, and that if the result of the investigation now being made by Commander Burstal was satisfactory, they would be prepared, should it be thought that the act of Parliament was so absolute as had been said, to deal with it forthwith. But, on the other hand, should the investigations prove that it was desirable to go lower down, the engineer's plans were capable of adaptation to the altered state of things; and this board would never hesitate to spend three or four hundred thousand pounds more to do the work in the most efficient and perfect manner. In any case, however, the works between the Lea and Barking Creek must be executed; and, in adopting the resolution which he now submitted to them, the board did not pledge itself to go to the latter spot, and no where else. Mr. Bazalgette had told them that, though if required he could go further without materially altering his plans, he was not prepared, as an engineer, to recommend an extension beyond Barking. Let not the board, therefore, have its attention distracted by opinions as to the construction of the act of Parliament, but fearlessly adopt the best plan for accomplishing the object. But did the act thus absolutely prohibit the sewerage from being placed in the Thames within the metropolis? If Mr. Leslie thought so, he ought, at the very earliest period of the discussion, to have put a resolution before the board, ignoring the report in every detail from beginning to end, because all along the proposed line of sewers there were outlets at different places—some twenty-eight on the south side, and nearly as many on the north side—which at times would come into action, and without which no sewer that could be constructed would be safe; and, whenever there was a storm, some portion of the sewerage mixed with the flood waters must find its way through these openings into the Thames. But what did the act of Parliament really say? Why, that this board "shall make such sewers and works as they may think necessary for preventing *all or any part* of the sewerage within the metropolis from flowing or passing into the River Thames in or near the metropolis." If the word "all" had stood alone, it would have left them no discretion; but the words, "or any part," were clearly diminutive of the whole, and gave a discretionary power to be exercised so as to secure most effectually the general object sought by the act. With this view, he had no hesitation in urging the board to adopt the proposition he had submitted.

Mr. WRIGHT said that, although it generally happened that no great public good could be effected without injury to some parties, it had not been shown, in the present case, that the discharge of the sewerage at the point indicated would be a nuisance to any one. Had they proposed to go further down the river, their point of outlet would have been wholly beyond their jurisdiction; nor was there another part of the banks of the Thames from Plumstead and Barking downwards which was of so little value, and which, therefore, apart from engineering considerations, would answer their purpose so well. If to these facts they added the consideration that here they would get such an outfall that in case of failure of the machinery they could discharge at all states of the tide, he felt convinced the board would acquiesce in the report, and Government would, if necessary, recommend to Parliament an alteration in the act, to enable them to carry it out; but he contended it was entirely a mistake to say that they were bound to pass the whole of the sewerage beyond the metropolis. The act gave them power to do it, to do it within a certain time, and to tax the inhabitants of the metropolis for doing it; but they were only to do it as far as necessary. The intercepting scheme was not compulsory, nor, if adopted, was it absolutely decreed that *all* the sewerage must be carried away by it. The act was clearly one of permission and not of command. According to Mr. Leslie's theory of construction, if the board had determined that their outfall should be at Richmond, as that was not "within" the limits of the metropolis, it would have been competent for them so to decide, notwithstanding the evident intention of the act; but if no part of the sewerage waters was to pass into the Thames, what sort of a tunnel would it require to carry it off? Why, the engineer told him that one of 30 feet diameter would be required, and that all the other sewers on the north side must be constructed in the same enlarged proportion. If this technical difficulty was to be again interposed, he (Mr. Wright would take upon himself to move that the outfall be at a point nearer to London, where it would clearly be *without* the metropolitan boundary. As to passing the sewerage below Barking, there were practical engineering difficulties to overcome. It would have to pass under the Lea, which was a navigable river, and the dip which would require to be made would cause the sewerage to have a tendency to deposit, whatever the amount of flow might be. Indeed, there would be no greater difficulty in crossing the Thames, and joining the northern and southern main sewers together, to carry them to one outfall. That the present plan would create no nuisance he was perfectly convinced, as would every one else be who considered the fact, that instead of being allowed, as now, to accumulate

for hours in a state of fermentation, the sewerage would be conveyed away, diluted with a large quantity of water (which, after all, was the best deodorising agent), at a uniform, constant flow, and delivered at high water into the river. Not only would there be no nuisance, but the Thames itself would be purified to an extent of which they had no conception. He therefore seconded the motion.

Mr. TURNER could not agree with the last two speakers as to the construction of the act of Parliament. No doubt the Legislature had given the board a discretion as to the intercepting sewerage of the metropolis, but it was perfectly clear to his mind that, if the board resolved to act upon that discretionary power, they were bound to carry the mouth of such sewers to a point external to the metropolitan districts. As regarded the plan now before them, he approved of it generally, though it was not within the literal meaning of the act. It certainly was within the spirit and intention of the act, and the Government, he had no doubt, if they approved of it, would bring forward a bill to relieve them of the technical difficulty. As to the complaint that the board were about to remove a nuisance from their own doors to place it before the doors of others, there was no truth in the statement. The sewerage now flowed past those very places, and what was proposed to be done was, to send it down in a much less offensive state, and under more advantageous circumstances, than hitherto it had been done.

Mr. SAVAGE moved the amendment which he proposed on the last occasion—

That no plan for the drainage of the metropolis north of the Thames can be deemed satisfactory that proposes an outfall within the metropolis.

Mr. DENNIS seconded the amendment.

Mr. CRELLIN expressed his regret at the decision of the board in reference to the western district, and urged that deodorising works should be constructed at the Lea, instead of carrying the sewerage down to Barking.

Mr. DIXON said, in every respect he believed that Barking Creek would be the wrong spot, on account of the peculiar formation of the river there; and, in his opinion, the expense would be very little more to carry the sewerage down to Dagenham Reach or Hornchurch Marshes, by getting off the aqueduct and into the ground as soon as possible, and by carrying the sewer under the creek at a point a mile higher up, where it was not wider than a mill-stream.

Mr. CORRIE recommended the postponement of the discussion, as he did not consider that the matter was sufficiently matured to enable the board to decide upon. As the proposed outfall was clearly within the metropolitan boundary, and therefore opposed to the act of Parliament, it would be better for the board to stay until they saw what the Government would do in reference to the plan for the southern drainage.

The amendment was then put, and negatived by a majority of five.

On the show of hands being taken on the original motion, there appeared

For the motion	15
Against	12
Majority	— 3

A motion for adjournment by Mr. WRIGHT, seconded by Mr. CARPMAEL, was, after a short conversation, withdrawn.

Mr. CARPMAEL said the next proposition he had to submit was one in reference to the alternatives proposed by the engineer in connection with the low-level sewer. The first of these alternatives, for which he had estimated the cost, was for carrying this sewer along the Strand, Fleet Street, and other densely populated places; and he stated that the large proportion of that work must be effected by means of tunnelling. That there would be serious inconvenience in carrying out a work of such magnitude there could be but little doubt; and they must all feel it desirable, if possible, to avoid such an interruption of the traffic as it must occasion. At the same time they must take care not to place themselves in a worse dilemma by getting upon the banks of the Thames, and there be interfered with. If they could carry out the low-level sewer hand in hand with a scheme of Thames embankment, it would, in an engineering point of view, have many advantages; but there were difficulties in connection with this mode of dealing with the question which must not be lost sight of; and amongst these was the necessity for erecting coffer dams along the entire line, to keep the water out during the progress of the works. Then, too, he believed they would be under obligation to go to the Government for the requisite power to carry it on. It would be dealing unfairly with the board if he did not candidly state to them that a suit in Chancery between the the Crown and the City of London, upon the rights of the parties on the river bank, had been pending for the last nine years; and it seemed as far off settlement now as ever. The Government had brought in a bill to take the conservancy of the Thames from the Corporation; but they had not dealt with this question at all. Therefore it would be necessary, as he said, to get the requisite permission before they could move in this matter at all. While, however, as the result of many years observation, he entertained a very strong feeling in favour of a plan of Thames embankment, yet, if it would cause any very great delay in the execution of their sewerage works, he would urge the board to abandon the idea, and adopt the other alternative. He was decidedly of opinion that it would tend much to improve the river if, by means of an embankment, its sectional area at different parts should be made to approximate. There was a plan for the embankment of a portion of the Thames propounded by Mr. Walker and Captain Bullock, who were appointed by the Corporation, with the sanction of the Admiralty, for the purpose. In his estimation that plan had never been surpassed.

Mr. LESLIE: It was rejected by the House of Commons.

Mr. T. H. HALL: No; never.

Mr. CARPMAEL was not aware that it had been rejected. He believed that this was a most important work, and ought to be carried out at the earliest possible period. He wished he could see his way out of the difficulties that surrounded it, as nothing would more tend to the healthfulness and general utility of the Thames. The City had offered, with great fairness, that the patronage of the works, and the salvages from the river, should be dealt with by a person appointed by the Government; but the Chancery suit was the result, and so it stood at the present moment. In order, therefore, to ascertain whether the Government were prepared to deal with the question, or would allow this board to do so, he intended to move—

That the report of the engineer, so far as it relates to the low-level sewer, be refered to the committee of works for consideration, and to report to this board on the alternative proposed in regard to the embankment of the Thames.

Mr. WRIGHT seconded the motion. This being the last work to be constructed, it did not press so much as the others, and therefore might safely be sent to a committee. Practically speaking, the Thames was already embanked by the projecting piers, the intermediate spaces being so many dormant lakes; and, if a row of piles were driven from the Houses of Parliament to the second arch of London Bridge, it would scarcely impede the traffic up and the river at all. The construction of an embankment would not entail upon the ratepayers a heavy taxation, as the land reclaimed from the river would be of immense value; it would afford space for a promenade on the top, and a railway underneath, by which goods could be brought down to the shipping. Unless some such plan were adopted, all the sewers between the Strand and the river, and now running into the Thames, would, when the other alternative was carried out, have to be reversed. It was very desirable to have a consultation with the Government on the subject; and perhaps, in order to get over the difficulty at present existing between them and the City of London, they would be very glad to hand the matter over to the Board of Works.

Mr. LESLIE objected to the motion altogether. A false step in reference to the Thames embankment might make the river not navigable.

Mr. HOWS also opposed, and Mr. TURNER supported, the motion.

Mr. T. H. HALL, as a member of the works' committee, begged the board to deal with the question themselves, as, whatever decision the committee arrived at it, would not prevent another and a prolonged discussion when they brought up their report.

Mr. WARE moved, as an amendment,

That a deputation of five members of the board be appointed to wait upon the Government, to know whether their co-operation could be secured in reference to a plan of Thames embankment.

Mr. SEELEY seconded the amendment.

On the motion of Mr. R. TAYLOR, the debate was adjourned to Thursday the 26th inst.

The proceedings then terminated.

WEDNESDAY, JUNE 18.

The ordinary weekly meeting of the board was held in the Council Chamber, Guildhall—Mr. THWAITES in the chair.

The minutes having been read and approved,

The CLERK presented a report on state of collections of improvement rates and charges for default for the month of May, 1856; and the board proceeded to issue warrants against defaulters on district sewers' rates, and to allow deficiencies on district sewers' rates.

Mr. SAVAGE moved, and Mr. HOWS seconded, the following motion, which after a brief conversation was agreed to:—"That a copy of the report by the accountant, recommended by the finance committee, and containing suggestions for the keeping of accounts by vestries and district boards, be sent to each vestry and district board."

A report from the committee of works was brought up and read, referring to the powers of this board under the 144th sec. of the Metropolis Local Management Act, with respect to the proposed thoroughfare between Brompton Square and Prince's Gate, and expressing the opinion that it is not at present expedient that any of the works suggested in the following communications should be effected:—Letter from Mr. Aveling, vestry clerk of St. Mary, Paddington, with reference to improvements in the Moscow Road, Paddington—Mr. Beaumont's suggestions for thoroughfares through the metropolis and St. James's and Hyde Parks—and the Memorial from Messrs. Parrott, Wheatstone, and Treeby, relative to a plan for metropolitan subways.

ENGINEER'S REPORTS.

The ENGINEER brought up reports on applications from vestries and district boards to construct sewers in Paddington parish—Westbourne Terrace Square; on defective junctions formed with main sewers by the District Board of Greenwich; on complaint from the Greenwich District Board of Works of flooding of houses, &c., by main sewer in Horsferry Road and Bridge Street, Greenwich; on application from the Board of Works for the St. Giles' District for an enlargement of the proposed sewers in Woburn Mews East, from 3 feet by 2 feet, half a brick in thickness, and two lengths of 12-inch pipe, as ordered by the board on the 30th of May last, to 3 feet 9 inches by 2 feet 6 inches, 1 brick in thickness, as originally applied for by the said board; on works executed on emergency; and on works to be executed under general contracts.

The board made the necessary orders in conformity with the engineer's recommendations.

METROPOLIS BUILDING ACT.

The board was occupied for a considerable time in receiving and discussing reports by the superintending-architect on applications for permission to construct buildings or make alterations under this act, but none of the cases call for special remark.

Several motions which were on the *agenda* were struck out, owing to the absence of the members giving the notices.

One or two motions of no importance were disposed of, and the board adjourned.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The adjourned General Annual Meeting of the Proprietors of this Company was held at the London Tavern, on Thursday, the 19th inst.—Mr. ERASMUS WILSON in the chair.

The proceedings commenced by Mr. MAGNUS OHREN, the secretary and manager, reading the advertisement convening the meeting, which stated that its object was "to receive the report of the directors, to declare a dividend, and for general business." The secretary also read the minutes of the last annual meeting and of the meeting which preceded the adjournment.

The CHAIRMAN said: We have now another formal duty to perform, which is to affix the seal of the company to the register of shareholders. The register is here, made up to the present moment; but, as our seal is a fixture, and cannot be brought here, perhaps you will authorise me to seal the register after the meeting.

Mr. GRAY (the secretary of the late committee of investigation) said: How can we consent to the seal being affixed to that register, when we have never seen it? We asked for the register of shareholders at our first meeting, but it was never produced.

The CHAIRMAN: Of course, if it is not your pleasure, we will not seal it.

Mr. BURRELL: We have sent note upon note, and have asked the secretary personally to produce that register, but we could not get it.

The SECRETARY: This book was not complete then.

Mr. BURRELL: It was the first book we asked for.

Mr. STEPHENSON: We do not say that you did not ask for a register; but this is a list correctly made up from the shareholders' ledger.

Mr. BURRELL: Then, why was that book withheld?

Mr. GRAY said, various resolutions which the committee had come to showed how much the withholding these things had impeded their progress.

The CHAIRMAN: When was this book commenced?

The SECRETARY: About a month ago.

The CHAIRMAN: Therefore, probably after the period to which Mr. Burrell refers?

The SECRETARY: It was.

Mr. GRAY: I call upon the secretary to produce the register which the committee did have before them.

Col. BAZALGETTE: I am sure, Mr. Chairman, you will see that it is a mere delusion to affix the seal to what we have never seen. You might as well be told to affix it to my hat.

Mr. Le Neve Foster: I have been present at many railway and other meetings, and I know that the first business is to affix the seal to the registry.

Mr. Gray: Probably the companies whose meetings you have attended were not placed in the same position as we are. According to the terms of the notices calling this meeting, it is "to receive the report of the shareholders' committee"—they having had under their examination the whole of the affairs of this company; and it appears to me that what is now proposed to be done is a departure from our proper business.

Mr. Stephenson: We had better, perhaps, waive the matter; it is of little consequence.

Mr. Pocock: It appears to me to be necessary to seal the register before we proceed to any other business. It is necessary that we should seal some list of the shareholders, otherwise we shall stand still for want of a formality. I admit the thing of which the committee complain is not regular; they certainly ought to have had a list when it was asked for.

Mr. Gray: I would call attention to one paragraph in the committee's report, and then ask you how we can give permission to seal a register which we have not examined?—

> As to the former (the register of shareholders), your committee found a book intended for this purpose, but scarcely could it be said that it was opened; it has since, under their direction, with the attention and diligence of Mr. Collins, been appropriated to its design, and properly filled up, so far as the shares of your company have been issued.

The Chairman: That is not the same book. That is the numerical register.

Mr. Gray: But we say that we have examined *a* register, and you now bring forward another.

The Chairman: I do not suppose that any harm will arise from our not doing it, and therefore, gentlemen, I will now proceed to read the directors' report.

Mr. Stephenson: I am not prepared, sir, to let that matter pass, unless any gentleman present is prepared to show that there are any errors in this book. I therefore move that the seal be affixed. I hope some gentleman will second me.

Mr. Foster: I shall second the motion. An observation has been made, to the effect that this is not the proper business before us. I believe that this is an adjournment from the annual meeting, and that we are now going to take up the business we then left unfinished; and I apprehend that our first duty is, not to take up the committee's report, but to affix the seal to the register.

Col. Bazalgette: Before that motion is put, I beg that the resolution appointing the committee may be read. You will then see that the object of this meeting is to take up the report of that committee.

The Chairman: It has been read.

Col. Bazalgette: But a gentleman to my right (Mr. Foster) says that the business of the meeting is not to take up that report. I say it is for that purpose principally, if not solely, that this meeting is held.

Mr. Stephenson: It is an adjournment of the annual meeting. The committee have no power to call a meeting under our deed. The directors have called this meeting to receive their report and to transact the general business of the company.

Mr. John Robinson: And therefore any business not brought forward at the last meeting, may be at this.

Mr. Stephenson: Exactly so.

Mr. Burrell: It is so out of place to ask us to vote for affixing the seal to a list of names we have never seen, that I shall move, as an amendment, "That the sealing of the register produced be postponed till such time as it has been properly investigated."

Mr. Hislop seconded the amendment.

Mr. Robinson: Can any inconvenience arise from its postponement?

The Chairman: None at all.

Mr. Downes. Therefore you had better pass it over.

Mr. Stephenson: We are perfectly satisfied with the correctness of the book, and it is not a usual thing to pass it over.

Mr. Downes: But you have heard from two members of the committee that they are not satisfied. I presume that those gentlemen, having been appointed by the shareholders, possess their confidence.

Mr. Stephenson: Will it satisfy those gentlemen to read over the names in this register?

Mr. Gray: If we have the other book to compare at the same time. It is only right that we who go before the public and say that we have examined the register, should know that it is the same to which we are asked to authorise the seal to be affixed.

Mr. John Bazalgette: I think I can set this matter right at once by reading the notice. It is, that this meeting is called "for the purpose of receiving the report of the committee of shareholders, the report of the directors, and for general business." If we take take these matters up *seriatim*, we shall be in order. I may say, that the list of shareholders now presented to receive the seal contains the names of several gentlemen who have been declared by the committee to be not duly qualified; I therefore move that we proceed in the order indicated in the notice convening the meeting—the first business being to receive the report of the committee.

Mr. Gray: I think the amendment is somewhat irrelevant, because, although the notice says "to receive the report of the committee," there is this matter *pro formâ*, which does not require to be on the notice.

Mr. Stephenson: It places the directors in a difficulty, because by the act of Parliament we are required to seal the register.

Mr. Downes: The answer to which is, that you have not got the seal here.

The Chairman: After this meeting, we are not sure but that the committee will cease to exist.

Mr. Burrell: I do not know that.

The Chairman: If not, the committee are the directors.

Mr. Stephenson: It is mere waste of time going on in this way.

Mr. Burrell (indignantly): I beg to say that it is not we who are wasting the time of the meeting; it is the directors and theirregularity of their servants.

The Secretary: This book contains the names of all the shareholders; the other one does not contain the names of those who are shareholders by transfer.

Mr. Gray: Why not produce the other book? Is this a copy of the other?

The Secretary: No; this is the original list.

Mr. Burrell: I say that this book was not in existence on the 1st of January.

Mr. Goodwin: I pledge my word that it was not.

Mr. Burrell: I have not been a member of this company long, but I have seen many irregularities, and when they have been pointed out, I have not found them corrected, but there has been a persistence in the wrong. Within a short period many shares have been transferred for purposes best known to those who have transferred them. I have a list of the shareholders up to the 25th of December, but they will be found very different to those now produced.

Mr. Stephenson: We cannot prevent shareholders transferring their shares.

After some further conversation, the motion and amendment were by consent withdrawn.

Mr. Burrell handed up the report of the shareholders' committee, which the Chairman read.

We are precluded by the length of this document, with its accompanying accounts, from giving it entire in our columns; we, therefore, append the most material points in it. The report commences by setting forth the difficulties which the committee had to encounter in prosecuting their inquiries, arising from the fact that they possessed "no detailed account of meters, fittings, or services; no record of coals used from day to day in the production of gas; no regular set of books opened until late in the year 1855, and then only partially, and especially the transfers from capital to revenue, or *vice versa*. These causes, with others, serve in some measure to explain the delay which has ensued." With reference to the auditors' refusal to pass the accounts, the committee state that they are "fully convinced of the propriety of this decision;" meantime they "have availed themselves of the best evidence they can obtain to prove that the payments have been substantially correct." Speaking of the Sydenham purchase, they "strongly recommend that steps should be taken, as opportunity occurs, whereby the residue of the Sydenham shares may be absorbed in the share stock of the Crystal Palace District Gas Company;" and in reference to the Sydenham shares held in trust for this company, they consider "that for property of so important an amount as these 635 shares, purchased at a cost of £7893. 4s. 6d., a legal deed of trust ought to be prepared and executed with as little delay as possible, unless the deed already engrossed can be made available." They complain that the register of shareholders had not been properly kept, and that "comparing this register with the deed of settlement, they find that 17 persons who have paid in part, and to whom shares have been allotted, have yet to execute it;" that there is a large amount of deficiency in the capital of the company arising from unpaid calls, and they recommend that some decisive measures should be taken to place the capital in a more satisfactory state. They then refer to certain unsettled or disputed accounts, the arrangement of which they recommend; and they complain of the quantity of coals bought, the absence of vouchers, and the mode of keeping the account of the revenue and floating stock. After commenting upon what they regard as a lavish distribution of shares by the directors, they make sundry recommendations—1st, as to the sale of the company's land on the west side of the Palace; 2nd, as to the mode of keeping the books and accounts; 3rd, as to improvement and repair of the works; 4th, as to the rate of dividend, which they state should not exceed 2½ per cent.; and, 5th, as to the assertion of non-qualification of some members of the board. The report concludes by a statement to the effect that the committee have received every facility from the directors, and have been much assisted in their inquiries by the untiring energies put forth by Mr. Collins, the accountant.

The Chairman: I now beg to move that the committee be thanked for their report, and that it be received and entered upon the minutes.

Mr. Sylvester seconded the motion.

Mr. Pocock thought that it would be better first of all to take the directors' report, and thus get through all the matters upon which they were likely to be harmonious, and afterwards come to those upon which there was likely to be a division. (Interruption.)

The Chairman: Let me press upon the gentlemen present one thing. You are each shareholders in the company, and are all interested in its success, and you can only get through the business by regularity of proceeding.

Mr. Foster then moved, and Mr. Stephenson Clarke seconded, a motion to the effect that the report of the directors be read.

Col. Bazalgette moved, and Mr. Downes seconded, an amendment, that the report of the committee be first considered.

Mr. Burrell protested against the directors' report, which was not a document according to the deed.

The amendment was then put to a show of hands, and declared to be carried.

Mr. Stephenson demanded a scrutiny.

Mr. Robineon said, if we take the report of the committee first, it is prejudging the case, and we ought to have the directors' report before us. There are many things in the document just read which cast so strong a reflection upon the board, that we must not take it in wholesale.

Mr. Burrell: I have not the slightest objection to the report being read, if the accounts are not to be adopted.

Mr. Stephenson: We only want to have the accounts before the meeting in the same way that you have your report.

Mr. Robinson: It would be an injustice not to do so, which I am sure the other side would not be guilty of.

Mr. Gray: The last speaker has spoken of "injustice," as though we (the committee) wished to do such a thing. I beg to tell him that the accounts we have presented are made up from the books of the directors, which have been certified. The directors now propose to bring forward accounts, the counterparts of which are not to be found in their books, and which are uncertified. I say that no board of directors can bring forward accounts which are not audited, and our directors do not pretend to say that these have been. The committee are your appointment; they have gone into every matter, and are prepared to show that they have tested every item which they bring forward.

Mr. Pocock: As one of the directors, I wish to say a few words. Cordially, and from the bottom of my heart, I thank the committee for their services, and I desire to see their report entered upon our minutes. I rather think, in some instances, that they are slightly wrong, but it is only slightly; while, on the other hand, in our report, I think we also may be slightly in error. Though I believe that our accounts are strictly true, there are certain things which are matters of opinion, and not of figures, upon which we differ, and upon which it is the duty of this meeting to decide. But how can they judge of the matter till they have the two statements before them? It is not my desire to carry the directors' report against the meeting; but I certainly think, and it is the opinion of the board, too, that their accounts are documents which should be placed before you, that both sides be heard, and then let the meeting judge.

Mr. Gray: I admire the spirit and the tone of your remarks, but I differ with you on this point—a question of figures cannot be decided upon by a public meeting; they require examination, as they are matters of detail.

Mr. Robinson: It is impossible to go into the accounts; but we can go into the report. All I contend for is, that there should be even-handed justice done in this matter. We have read the committee's report, and taken their accounts as read; and the same thing ought to be done with the directors'.

We do not pledge ourselves to adopt either. I have gone through both accounts myself, and find that the difference is exceedingly small. With the exception of £210 put down by the committee for wear and tear of retorts, and £400 or £500 less in the valuation of stock than estimated by the directors, there is only one item of £14 for dividend, and another small sum for discounts, in dispute.

Mr. GRAY: We do not differ with the directors as to the value of the stock; but we disagree with the wish of the directors to take credit in revenue for what they have taken out of capital. Show me that you have paid for what we complain of out of revenue, and then by all means take credit for it.

The poll was then taken, when there appeared—

For reading the directors' report	414	
Against	231	
Majority		——183

The CHAIRMAN read the report, as follows:—

TO THE SHAREHOLDERS.

Gentlemen,—The directors of your company beg to lay before you their report for 1856, as prepared for circulation among the shareholders on the 14th of February last. They intended at the same time to have laid before you the balance-sheet, as prepared by the accountant, Mr. Collins, for the auditors. The shareholders, are, however, aware that the auditors objected to pass these accounts, and the request of the directors at the general annual meeting of March the 4th ult. for delay was not acquiesced in, but a committe appointed to inquire into the affairs of the company. This committee have now issued their report; but as, in the course of their labours, they have made erasures and alterations in the books, which have created a difference between the balance-sheet of the directors and the books as they now stand, it became necessary to prepare a new balance-sheet, particularly as the directors could not adopt as correct the balance-sheet prepared by the committee. They have endeavoured, in the new balance-sheet, to agree with that of the committee as far as they were able, altering those items only on which a great difference existed. Before the general meeting, however—namely, on the 29th of February—it was determined by the directors to appoint a professional accountant to examine into the state of the company's accounts. With this object, Mr. Pashley, the accountant to the Commercial Gas Company, was selected, both for his character as an able accountant, and as being conversant with the accounts of a gas company. Mr. Pashley commences his report as follows:—"I beg to report that I have completed the auditing of your books and accounts; and, from the time and care bestowed in going through and checking every entry, and comparing them with the vouchers produced, I can confidently state that I find them (with the exception of one or two clerical errors) perfectly correct, and that the balance-sheet, as made up, is strictly in accordance with them."

It was for the purpose of giving time to a professional accountant to examine the accounts that the note of Feb. 5, calling the general meeting, was altered, and the words, "This meeting will be formal, for the purpose of adjournment until Thursday, March 27," were introduced. That this delay would have been sufficient for the purpose is shown by the fact of Mr. Pashley's report having been completed, and entered on the minutes of the directors on the 22nd of March last.

REPORT OF THE DIRECTORS TO THE SHAREHOLDERS, TO BE READ AT THE SECOND ANNUAL MEETING, IN MARCH, 1856.

The directors have the satisfaction of reporting a general improvement in the company's affairs since their last meeting—such improvement embracing enlargement of works, increased extent of mains, increase in the number of consumers, and augmented revenue.

In their previous reports the directors mention the importance of "arranging a boundary with a neighbouring company," and express the hope of being able to call together the shareholders, to lay the result of their negotiations before them; and, in a circular bearing date Nov. 1, 1855, the shareholders are informed that the directors "have completed in the most satisfactory manner their agreement for a boundary" with the company referred to, and that "their district now includes Dulwich Hill, Gipsy Hill, Crown Hill, and the whole of Upper Norwood." This arrangement was rendered necessary by the fact of the mains of the two companies lying in some instances side by side in the same street, and consequently interfering with the comfort and interests of both companies. The two companies have agreed to a line of boundary mutually decided upon; and, as this boundary included mains, services, meters, and consumers of the South Metropolitan Company, amounting in value, the former to £870, the latter to an annual rental of about £400, your directors have purchased the interests of the South Metropolitan Company embraced by this limit for the sum of £1289. 2s. 5d. The directors feel confident that the shareholders will consider they have effected this arrangement with judgment, and with a full appreciation of the interests of the company; its advantages to this company admit of no question.

It will be in the recollection of most of the shareholders that, previously to obtaining possession of the works of the Sydenham Gas and Coke Company, it was the intention of this company to build new and extensive works at Lower Norwood; but, on the completion and enlargement of the works at Bell Green, it was perceived that smaller works than those originally designed would meet all the requirements of the district on the Norwood side of Sydenham Hill; that, in fact, a gasholder and apparatus already in the hands of the company would, with the contemplated extension of the mains from the Bell Green station, supply the district in Lower Norwood, and be sufficient for all its wants. More recently, the directors have had reason to believe that the same purpose may be effected without the erection of new works, and without the expenses of superintendence and working necessarily resulting from the establishment of a second station, by the mere extension of their mains in a direction and upon a plan which have received the approbation of the consulting engineer. Assuming, therefore, that this object can be safely and satisfactorily attained, your directors recommend to the shareholders the abandonment of the proposed works at Lower Norwood, and the sale of the land there, for which they think it probable they will be enabled to obtain a good price, in consequence of the increased value of land in the neighbourhood applicable to building purposes.

During the winter, your directors have entered into a contract with the Croydon Local Board of Health to erect and supply public lights (above sixty in number) in Upper Norwood, the lights extending from the top of Knight's Hill Road, at Crown Hill, along the Beulah Spa Road to Beggars' Hill, and thence continuing around Upper Norwood to Westow Hill. The mains supplying these public lights will be available for the purposes of private lighting, and already applications have been made to lay services to the private houses along and immediately adjoing the line. The necessity which exists for public lighting is the best proof that can be given of the increasing importance and population of the neighbourhood; and the directors trust that, before long, the inhabitants will see the advantages that must result from properly lighting every public road in the district.

Impressed with the importance of having the accounts of the company made up with the most exact fidelity from the earliest commencement of its expenditure, and of putting these accounts in the clearest manner before the shareholders, the directors have engaged the services of an able accountant, who has completed these accounts up to Christmas last. Some slight alterations having, in consequence, been made in the liability account of the balance-sheet of December, 1854, the directors have thought it desirable to reprint that balance-sheet, to have it audited anew, and again submitted to the shareholders for their approval. In the balance-sheet for the year ending December 25th, 1855, the shareholders will perceive a balance on the revenue account of £1692. 18s. 2d.;* out of this sum the directors propose to pay a dividend of 5 per cent., and carry over the remainder to the profit account of the next year.

The directors have also given their attention to the calls in arrear on shares. During the past year a large sum has been collected from this source (£4129), and the directors hope that this sum will be further increased by the anticipated improved financial condition of the country. Should that not be the case, they will be under the necessity of putting in force the powers of forfeiture given to them by the deed of settlement of the company. The directors again remind the shareholders that no dividend can be paid to those who are in arrear with their calls, and who have not signed the deed of settlement. They trust, therefore, that those shareholders who have not already complied with the regulations of the company will lose no time in fulfilling them.

In accordance with the provisions of the deed of settlement, which require that one-third of the directors should go out of office annually, two of the directors, viz., Mr. Erasmus Wilson and Mr. H. P. Stephenson, go out of office by rotation at the present meeting; and, being eligible, offer themselves for re-election. The directors have also to report that during the past year they have elected to fill places in the direction Colonel John Bazalgette and Mr. Alfred Tubb Windus; the latter gentleman offers himself for confirmation in office by the shareholders; the former has retired from the board in consequence of ill health, and the directors do not recommend that the vacancy should be filled up.

In reference to another point mentioned in their first report, the directors feel that the time has come for proposing to the shareholders the consolidation of the company by act of Parliament. In their former report, the directors remark that "an act might be procured without much trouble, and at small expense, while the advantages to the company, both as relates to the future security of the district and the increase of profits would be very great." An act could not be procured until the next session of Parliament; but, as it would be necessary to take the preliminary steps for that purpose in November, the directors now ask the assent of the shareholders to proceed in the matter, and carry it through with all the despatch of which such proceedings admit.

The directors now take their leave of the shareholders for another year, after placing in their hands complete financial accounts and balance-sheets of the company from its origin and first formation to the present time.

Bell Green, Sydenham, Kent, Feb. 14, 1856.

Turning now to the report of the committee, the directors are willing to admit a general desire on the part of the committee to arrive at a knowledge of the true state of the company's affairs; they believe, however, that the committee have been misled on many points by the sources from which they have derived their information. The directors regret that they were not appealed to for explanation during the progress of the inquiry, as such an appeal might have prevented the necessity for the explanation to the shareholders which they now feel it their duty to make.

In the fifth paragraph, the committee remark, as one of the difficulties of their task, upon the want of a "detailed account of the property purchased from the Sydenham Company." The directors regret that this statement is correct, the account in question having, they believe, been taken away, with other books belonging to the company, by their late engineer, Mr. Hanson. With regard to "inventory of floating stock," "account of meters, fittings, or services," and "record of coals used from day to day," the directors beg to say that such inventory, account, and record, are in existence, and have been regularly kept for the last twelvemonth. The want of a "regular set of books" the directors endeavoured to supply by the appointment of Mr. Collins in July, 1855, and that deficiency can no longer be said to exist. As regards the charge of "numberless misappropriations" in capital and revenue accounts, this is a point upon which those only who are conversant with gas affairs can give a proper judgment. The directors were guided in apportioning the sums referred to by the advice of competent authority.

In respect of the "non-existence of proper vouchers for sums of large amount," as stated in paragraph 7, the directors find that the only vouchers wanting are such as are due from officers who have left the service of the company, and with whom the directors are now in dispute; as soon as those disputes are settled, the vouchers will be obtained. The "accounts and invoices not certified" is one of the numerous neglects which have occurred in the department of the late accountant and secretary.

The directors feel the importance of possessing, on the part of the company, such of the Sydenham shares as may be open for purchase from time to time; but they are at the same time of opinion that it would be unadvisable to purchase these shares, excepting at a lower rate than that at which they have been heretofore offered to the company. The extravagant nature of the trust deed of these shares, it is needless to say, is one of those acts over which the directors were unable to exercise control; but, as soon as they were made aware of the extent of the law-charges brought against them, they took the step with which the shareholders have been made acquainted—namely, of referring those charges to the taxing-master. The Sydenham shares now in the possession of this company are held by gentlemen, all of whom have executed declarations of trust which secure them legally and indisputably to the company. These declarations were made at the time the various assignments took place.

In paragraph 10, the committee mention the existence of a numerical list of shareholders, which "scarcely could be said to be opened." The directors, in order to give their late accountant and secretary the opportunity of completing this book, appointed Mr. Collins, in July, 1855, to take the labour of the accounts off his hands; and they regret that the list in question should have been left uncompleted. The directors have already taken, and continue to take, the usual steps to obtain the signatures of the whole of the shareholders to the deed of settlement.

The unsettled and disputed accounts are in a fair way of being completed. In reference to Mr. Downes, the taxing-master's certificate on this matter declared a large balance in favour of the company. The majority of the accounts due at Christmas last have been regularly discharged.

The 13th paragraph of the report censures the quantity of coals bought in 1854. The directors acted in this matter on the recommendation of their engineer, Mr. Hanson, and upon private information that the demand upon them for gas during the winter might be very largely increased; and they were further induced to lay in a large stock in consequence of the high price of coals during the preceding winter. When they found that they had more than they required to carry them through the year, they entertained offers from one or two parties for their sale, but did not receive an offer which they felt would justify them in departing from their strict line of business. The directors may further remark, that in all important purchases they have never departed from the principle of receiving tenders, and have always obtained prices from various parties before giving orders for pipes, &c. In respect of the price of iron, they have always accepted the lowest tender from a responsible contractor, unless in cases where time was of importance.

The absence of vouchers from retired officers has already been explained. The debenture bond of Mr. Nevins was delivered up to, and cancelled in the presence of, the board.

With respect to the remarks of the committee on the *revenue and floating stock*, the directors have to say that the stock has been valued by their consulting engineer, Mr. R. M. Christie, for many years engineer-in-chief of the Commercial Gas Company, and formerly engaged in the Phœnix Gas Company, who has had the working of the company under his care since Mr. Hanson left, and in whose experience the directors have the greatest confidence. They have been again assured that the stock is correct, and they are not disposed to take the valuation of any other person unknown to them. The directors consider the committee to have been in error in not calling Mr. Christie before them. As regards the ammoniacal liquor, the directors are so impressed with the value of this product, that, under the advice of Mr. Christie, they are about to erect evaporating pans for the purpose of obtaining the solid sulphate of ammonia. The clerical error mentioned by the committee, and attributed to Mr. Christie, was made by the late engineer, Mr. Hanson. The directors consider that the salary given to Mr. Christie is not greater than is perfectly justified by the duties which devolve upon him; they believe the committee to have been misinformed on this point.

The directors quite agree with the committee on the advisability of reducing, as far as possible, the working expenses of the company. The have already in their report drawn the attention of the shareholders to the sale of the land at Lower Norwood.

On the subject of *books and accounts*, it must be mentioned that the directors have had a gas consumers' ledger from the commencement of the company—this ledger being a fac-simile of that used by one of the largest London gas companies, and that this book has been accurately kept; they have also meter, service, and fitting books. The committee are in error with regard to the mode of measuring the quantity of coal carbonised; a carbonising book, the same used by Mr. Stears when the works were in the possession of the Sydenham Company, has been kept up to the present time.

As to improvement and repair of works, the state of incompleteness of the engine-house arises from steps being in progress for erecting a new engine, boiler, and exhauster—the machinery having been ordered some time before Christmas last. The directors are also in treaty for the sale of all surplus apparatus and the gasholder at Norwood. The question of the erection of a coal store and of an office on the works has been several times under discussion by the directors, but they are not yet prepared to recommend their erection.

As regards the charge made by the committee in their balance-sheet for depreciation of retorts, &c., the directors have had a special report made to them by Mr. Christie, who expresses himself in the following words: "The TOTAL VALUE of the average

* In consequence of the alterations of the books by the committee since this report was written, this sum is now reduced to £1447. 8s. 4d. in the balance-sheet now presented by the directors.

number of retorts that has been at work would not amount to more than *half* the sum charged *for wear and tear alone;* and the retorts, with the late repairs (principally to the furnaces), are now in the most perfect working condition, some of them having been worked an additional six months from the date at which the balance-sheet is made up to. The system suggested, and which was being carried out by your board, was to keep these retorts at all times in a perfect working condition—the renewals and all repairs being executed out of revenue; this, up to the present time, has been done; and, therefore, any sum written off for wear and tear is superfluous."

It is chiefly on the valuation of the stock and the charge for depreciation that your directors differ with the views of the committee.

ERASMUS WILSON, *Chairman.*
GEO. AUG. OLIVER, *Deputy Chairman.*
H. P. STEPHENSON.
G. PEARCE POCOCK.
GEO. SILVESTER.

Bell Green, Sydenham, June 6, 1856.

The subjoined accounts were taken as read:—

CAPITAL ACCOUNT, FROM JUNE, 1854, TO DECEMBER, 1855.

Dr. RECEIPTS.				*Cr.* EXPENDITURE.			
To 3838 shares, at £10 each	£38,380 0 0			By Sydenham shares	£7,574 0 0		
Unpaid on the same	8,672 13 2			„ interest	144 4 6		
Capital paid up		£29,707 6 10		„ discount	175 0 0		
Loans (repaid per contra)		3,500 0 0				£7,893 4 6	
Debentures	7,300 0 0			„ debts	3,666 18 5		
Surplus calls	11 0 0			„ rates and taxes	37 17 11		
		7,311 0 0		„ dividend	663 17 6		
Sydenham dividends	365 2 6			„ debenture paid off	600 0 0		
„ bankers' balance	155 0 7					4,908 13 10	
„ assets, gas rents	£1,048 14 10			Crystal Palace District Gas Company, debenture paid off		550 0 0	
Coke	114 8 9			Repaid loans		3,500 0 0	
Fittings	84 12 4			Advertising	389 5 10		
	£1,247 15 11			Preliminary expenses	58 18 6		
Less bad and uncollected	134 13 2			Office expenses	8 18 4		
	1,113 2 9			Share commission	322 12 0		
		1,613 5 10		Stationery and printing	156 0 3		
				Promoters' purchase	1,750 0 0		
				Law expenses	292 16 4		
				Ditto J. Downes (see below)		2,978 11 3	
				J. Downes*	684 0 4		
				C. Goodwin	39 0 4		
				Phœnix Gas Company	6 3 9		
						729 4 5	
				Land purchase		1,425 0 0	
				South Metropolitan Gas Company		1,289 2 5	
				Directors' attendance during formation	400 0 0		
				Salaries	86 0 0		
						486 0 0	
				Office furniture	74 4 3		
				Ironwork account	3,191 0 11		
				Iron pipes, pipe-laying, and carriage	7,071 16 8		
				Works, building, and wages	2,903 15 6		
				Retorts	106 3 0		
				Meters	418 14 9		
						13,765 15 1	
						37,525 11 6	
				Revenue account	1,757 12 2		
				Balance at bankers'	2,848 9 0		
				Cash balance carried down		4,606 1 2	
		£42,131 12 8				£42,131 12 8	

Dr. CAPITAL ASSETS.		*Cr.* LIABILITIES ON CAPITAL.	
Cash balance brought down	£4,606 1 2	Sydenham debentures	£1,200 0 0
Unpaid on calls	8,672 13 2	Debentures and surplus calls	6,761 0 0
Iron pipes and apparatus not in use	369 19 6	Sundry accounts and balances	1,356 5 7
John Downes* (an unsettled account)		Thorndike and Smith, solicitors	
Charles Goodwin (an unsettled account)			
Land at Norwood	1,425 0 0		

REVENUE ACCOUNT, FROM JUNE, 1854, TO DECEMBER, 1855.

Dr.	1854.	1855.	TOTAL.	*Cr.*	1854.	1855.	TOTAL.
To shareholders' dividend	£409 19 8		£409 19 8	By rent	£ 7 16 5	£38 10 0	£ 46 6 5
Stationery and printing		£38 10 5	38 10 5	Sydenham dividends	151 19 2	505 9 7	657 8 9
Stores, tools, &c.	5 11 8	47 8 0	52 19 8	Gas and meter rents	1,736 16 11	5,078 8 8	6,815 5 7
Petty works' expenses	19 14 10	66 10 9	86 5 7	Coke, tar, ashes, and old iron	415 11 6	1,537 8 9	1,953 0 3
Lime	39 6 5	94 13 3	133 19 8	Services and fittings	203 6 10	329 7 2	532 14 0
Fittings and services	188 12 10	118 15 4	307 8 2				10,004 15 0
Coals	3,496 15 5	857 19 7	4,354 15 0	Wages—Balance in hand			30 0 0
„ carriage	528 17 0	136 15 1	665 12 1	C. Goodwin, dividends—Balance in hand			5 0 8
„ cartage	308 3 6	81 9 10	389 13 4	Stock—			
Gas purchased		19 3 6	19 3 6	Coals		1,155 1 3	
Carriers		7 14 5	7 14 5	Coke, tar, breeze, ammoniacal liquor, &c.		285 13 1	
Directors' attendance	100 0 0	250 0 0	350 0 0	Stores		235 9 8	
Salaries	150 0 0	359 1 10	509 1 10				1,676 4 0
Wages, including coal trimming	282 6 9	585 8 3	867 15 0				
Auditing	10 10 0		10 10 0				
Office expenses	27 10 4	120 9 7	147 19 11				
Rent	53 5 0	102 14 9	155 19 9				
Interest on loans	66 0 6	98 9 9	164 10 3				
Interest on calls in advance		1 5 2	1 5 2				
Interest on debentures	42 8 4	226 17 1	269 5 5				
Rates and taxes	20 2 11	90 19 3	111 2 2				
Commission on collecting gas rents		69 8 0	69 8 0				
Bad debts, &c.		95 11 4	95 11 4				
Gas damages		3 10 0	3 10 0				
Insurance		5 3 0	5 3 0				
Sydenham rent	195 8 4	819 11 8	1,015 0 0				
Meters, repairing		26 8 0	26 8 0				
			10,268 11 4				
Balance			1,447 8 4				
			£11,715 19 8				£11,715 19 8

* The taxing master has certified that there is upwards of £500 due from Mr. Downes.

Mr. DOWNES: Perhaps, as it is not stated in the report, I may as well say that my account with the company is settled. It was so before the date of the report, and the directors ought to have done me the justice to say so.

Mr. STEVENSON: It had not come to our knowledge when the report was prepared.

Some discussion arose in reference to an item in the accounts of a loan made by the chairman to the company, the interest on which was alleged by Col. Bazalgette to be exorbitant; but the peculiar circumstances under which it was made having been explained by Mr. Stephenson, and corroborated by Mr. Stears, it appeared to give satisfaction.

The CHAIRMAN: I beg now to move that the report of the directors be accepted, adopted, and entered on the minutes.

Mr. STEPHENSON CLARKE seconded the motion.

Mr. ROBINSON: I think there can be no objection to carry this motion, because there is nothing in the report which we can object to. I suppose, after adopting the report, it will be proposed to go *seriatim* into the recommendations of the committee, and I am sure this meeting will have great pleasure in attending to their suggestions. There is one item in the directors' report which, I presume, we shall not bind ourselves to, if this motion is passed, and that is the 5 per cent. dividend.

Mr. STEPHENSON: No; we pledge ourselves to bring that question separately before the meeting.

Mr. BURRELL: The directors' report is an informal document, the accounts are uncertified by any auditor, and they are signed by only five directors out of the eight. I shall therefore move, as an amendment, "That the report be at once rejected."

Mr. GORNALL seconded the amendment.

Mr. JOHN BAZALGETTE commented at some length upon the report of the directors, and warned the meeting, that in adopting that document they were virtually ignoring the report of the committee appointed on the 4th of March. He had read the latter report with attention, and considered that the committee had gone into the investigation of the company's affairs like men of business. The results at which they had arrived were so much at variance with the statement of affairs placed before them by the directors, that the meeting ought to pause before pronouncing a decision upon matters of such great interest to the proprietors at large. He was quite sure, from a careful examination of the accounts, that they could not afford to pay a 5 per cent. dividend out of the revenue. He would ask Mr. Collins, the accountant, whether he considered there was a sum of £1400 applicable for dividend?

Mr. COLLINS said he must leave that question for Mr. Gray to answer.

Mr. GRAY thought the question ought not to have been put to Mr. Collins, who was acting under the direction of the committee, and had shown great diligence in the investigation of the company's affairs. The committee had no hesitation in saying that what they had recommended was all that ought to be divided. In estimating the amount of depreciation, there was no difference among them as to the principle; they had reckoned depreciation upon the whole of the retorts and buildings, and the only question among them was as to amount, which might perhaps make a difference of £50.

Mr. JOHN BAZALGETTE, in concluding his remarks, said, the only fault on the part of the committee was their leniency towards the directors. He called upon the meeting to support the committee. The report and accounts of the directors were perfectly informal, and contrary to the company's deed; and if they paid the dividend, each proprietor would be liable to an action at law to recover the amount back again.

Mr. Gray asked for the carbonising book, that he might be able to trace whether sixty chaldrons of coke, stated to be at the works when the stock was taken, was entered.

Mr. Christie explained that that was the stock of coke produced by carbonising between the evenings of the 21st and 24th of December, at which latter period the stock was taken, less some small sales made in the interim. He expressed his regret that in pursuing their inquiries the committee had not called him before them, as, having the entire charge of the works, he was in a position to give them more correct information than they could obtain from inquiries made of the lubouring men on the spot.

Mr. Gray: I call for the book confirming Mr. Christie's statement.

The Secretary: It is not here.

Mr. Stephenson: I have seen the statement in the book, with Mr. Christie's signature to it.

Mr. Gray: I know you have, and have made alterations in it in pencil.

Mr. Christie said, with regard to the ammoniacal liquor, the directors had come to the conclusion that it was desirable to make sulphate of ammonia on the works, where the liquor was positively valuable.

Mr. Gray: Produce your sulphate of ammonia, and then take credit for it; but, before you can make it, you must erect your works.

Mr. Christie: We have begun them.

Mr. Burrell: I have asked several gentlemen high in authority, and they tell me the liquor is perfectly valueless.

Mr. Christie: I can tell you of a manufacturer of ammonia, at gas-works in London, who makes more than £300 a year by it.

A long and most irregular conversation took place on a variety of points, and great warmth of feeling was manifested.

On the question being put,

Mr. Gray said, if the report of the directors were adopted, the committee would have to enter their protest against it, and that would involve the necessity of keeping the committee in existence, to protect the interests of the company, and to see that the works were properly conducted.

On a show of hands, the amendment was carried.

A scrutiny being demanded, the number of shares represented by the proprietors present and by proxy was taken, when there appeared

Against the amendment	1217
For it	231
Majority	—1086

The amendment was therefore lost, and the report of the directors adopted.

On the motion of the Chairman, seconded by Mr. Foster, a dividend at the rate of 5 per cent. was then declared.

The retiring directors, Messrs. Windus, Stephenson, and Wilson, were re-elected.

The Chairman then said, with a view to show our anxiety to do all we can to meet the wishes of the committee, the three directors who are objected to by them, on the alleged ground of disqualification, Messrs. Foster, Oliver, and Pocock, resign their places into your hands, and offer themselves for re-election.

There being no opposition, these gentlemen were declared to be re-elected.

Mr. Stephenson Clarke proposed, and Mr. Robinson seconded the appointment of Mr. Headly, of Norwood, and Mr. Pashley of the Commercial Gas Company, as auditors of this company.

Messrs. Gray and Burrell were proposed for the office by Mr. Foster, seconded by Mr. Downes, but, as they positively refused to act, the first-named gentlemen were elected.

The Chairman: I think we cannot separate without a vote of thanks to those gentlemen who have look into the affairs of the company by your desire. I mean the committee of shareholders. Personally, I feel much obliged to them for their exertions, and I am sure that feeling is responded to by all the directors. We know they have had a great deal of labour, and we regret exceedingly that that labour has been forced upon them; and we can only offer in apology a consideration of the difficulties under which this company has been burdened since its commencement. We trusted, at one time, too much to our officers, and found that our books had got into a most disordered state. We then appointed Mr. Collins, who has been engaged upon the accounts upwards of 12 months; and I believe, through his exertions, they are now in a proper condition. I express my heartfelt gratitude, when I propose a vote of thanks to the shareholders' committee for the manner in which they have pursued their inquiries.

Mr. J. Robinson seconded the motion, which was at once agreed to.

Mr. Burrell, as chairman of the committee, acknowledged the vote, and at the same time handed up a protest against the directors' report being received, it being an illegal and informal document. He also took the opportunity of acknowledging the obligations of the committee to Mr. Collins for the valuable services he had rendered them in the prosecution of their labours.

On the motion of Col. Bazalgette, seconded by Mr. Stephenson, it was resolved that the expenses sustained by the committee should be paid out of the funds of the company.

A vote of thanks to the chairman was then agreed to, and the meeting, which had lasted five hours and a quarter, separated.

REPORT TO THE COMMISSIONERS OF SEWERS OF THE CITY OF LONDON, UPON THE AYLESFORD PIPES.

Sewers' Office, Guildhall, May 27, 1856.

Gentlemen,—Pursuant to your directions, that I should examine and state my opinion as to the fitness of the Aylesford pipes for the purposes of sewerage and house drainage, I have carefully examined the said pipes, and have also instituted and witnessed some experiments upon them, the better to enable me to arrive at a sound conclusion, and beg now to report my opinion.

In pipes intended for sewers and house-drains, the principle desiderata are, that they shall be strong enough to resist external pressure and concussions, and withstand the casualties to which in use they may be subjected; that they be of a correct and uniform shape upon the sections, whether transverse or longitudinal; that they be smooth upon their internal surfaces; and that the material of which they are composed shall be capable of withstanding the usual effects of the soil, of water, and time; that, in brief, they shall be very durable: to this I may add, that there is a popular feeling in favour of their being impermeable, and being glazed internally.

The pipes which have been almost exclusively used for sewers and house-drains within the metropolis, and indeed throughout the whole country, are principally formed of a clay brought from Devonshire and Dorsetshire; they are manufactured at several places in England, and the article is generally known as "brown stoneware;" but, as the largest quantity for metropolitan use have been manufactured at Lambeth, from that circumstance these pipes are generally spoken of or described as "Lambeth stoneware pipes." They have been in use many years; were originally of insufficent thickness, and of comparatively inferior quality, but they have been gradually improved in every respect; and now, when of the best quality, their transverse section (when within certain limits as to size) shows a sufficiently true contour for all practical purposes. They are, when made of the thicknesses which experience has demonstrated to be necessary, of sufficient strength; they are semi-vitreous in structure, and are therefore impermeable; and they are tolerably smooth upon their internal surface, and are therefore well adapted for the passage of fluids; and they have mostly upon their internal surface a high glaze, called, from the process by which it is obtained, "salt glaze." These pipes have, indeed, been of great value for sanitary purposes; from the almost universal acquiescence in their value and their equally universal adoption, they may be taken as the best practical standard we yet possess, by which to judge of the fitness of other pipes for similar purposes; and therefore, in considering the fitness of the Aylesford pipes for forming sewers and house-drains, I shall, whenever comparison is requisite, refer to the "Lambeth stoneware pipes."

The Aylesford pipes are stated to be formed from a plastic clay found in the valley of Aylesford, near Maidstone, at which spot they are likewise manufactured. The texture of the material of the pipes is uniform; they are sufficiently burnt and dense to ring; they are made thicker than the Lambeth stoneware pipes; their sectional forms are true, and they are smooth upon the internal surface; they are covered both externally and internally with a slight glaze, but the material of which the pipes are composed, not being vitrified, is somewhat porous and absorbent; lastly, they are in price 10 per cent. lower than the Lambeth stoneware pipes.

With regard to the point of first importance, strength, the manufactured material is of less specific gravity and density than the Lambeth stoneware, and is relatively weaker in point of resistance to crushing power; and pipes of equal thicknesses would, in this respect, be inferior to the stoneware; they, however, appear to be made thicker, and therefore, in capability of resistance to direct an uniform pressure, are nearly equal to the stoneware. This has been shown by experiment undertaken by Mr. Bazalgette some time since, and recently by the experiments I have instituted. Were they not so, a trifling increase in thickness would give the strength that is required: but I consider that, as made, they are sufficiently strong for all practical purposes.

When the material forming these pipes has absorbed water to its utmost, their capability of resisting pressure appears to be somewhat increased.

The pipes appear to me to resist percussion better than the stoneware. for blows which will shiver the stoneware will only crack the Aylsford pipes, Experiments appear also to demonstrate that they crack for the most part longitudinally rather than transversly, and that, when once cracked, a greater amount of purcussive force is needed to demolish them than it took to crack them; indeed, a frequent repetition of a blow of equal force upon the same spot, upon a cracked pipe, results only in many instances in a hole gradually being pounded at the point of impact. Consideration of the structure of these pipes, with their fibrous-like fracture, might lead this to be expected; and, in this respect, the pipes have an advantage over anything in structure more brittle—a point of some value in practice, as, without doubt, a large number of pipes have been cracked and fractured by the filling in and ramming of the earth over them.

I think, therefore, that as regards strength and capability of resisting those agencies, against which strength is the safeguard, that the Aylesford pipes have all that is required.

As regards sectional form, the Aylesford pipes are very perfect; they are, in fact, in this particular, superior to the average of the Lambeth stoneware; and, being subjected in their manufacture to far less intensity of heat than the latter, the chances of perfect form generally is greater; for the intense heat needful for semi-vitrification and glazing is one of the reasons of the cost, as it is one of the difficulties, in manufacturing stoneware of perfect form. I state this fact as to sectional form; but I must observe at the same time, lest I lead to erroneous inference, that I consider well-made stoneware pipes are true enough in form for most practical purposes.

In respect of internal smoothness—meaning by that term the evenness of surface, which may be obtained without glazing—I consider the Aylesford pipes are quite equal to stoneware pipes, and sufficiently so for sewerage purposes; but the glaze upon them is inferior to that upon stoneware pipes.

The question of the value of the glazing of sewer and drain pipes therefore opens, and upon this point I will offer a few observations. For many years past this glazing has been advocated, there being apparently a popular impression that the friction of fluids in motion in channels thus coated is much reduced; that the velocities and scouring powers are consequently greater, and the chances of deposit being thus diminished, the efficiency of drains, when formed by tubes having glazed internal surfaces, is increased.

I believe this to be fallacious. Hydraulic experiments tend to prove that the nature of the surfaces, provided they be smooth, influences but little the velocity of a fluid in motion; that, practically, the surfaces of all channels become coated or lined with a pellicle or film of the passing fluid, which film remains nearly stationary; and that the bulk of the fluid, with the velocity due to its generating cause, passes over this film; and it may be said, therefore, that the fluid passes through a fluid tube within the solid tube. It is even questionable whether a glazed surface does not retard rather than accelerate velocity; and of two tubes of small diameters, one being glazed and the other not glazed, but both being equal in smoothness and in other conditions, I believe that, if any superiority of discharge was shown, it would be by the tube not glazed, but that the discharge would be as near as possible the same in both cases

I may remark, also, that the inverts of most drains and sewers, which carry off sullage waters, in a short time become coated with a slimy deposit; and this is the case whether they be formed of the softest bricks or of the hardest impermeable stoneware; therefore, the surfaces of the material itself in all cases become practically the same as regards smoothness.

My opinion therefore is, that, provided they be smooth, the glazing of pipes is of no importance, as regards the effect upon the passage of fluids; that the fitness of pipes for sewerage purposes is determined by their other conditions; and that, whether the Aylesford pipes are as well glazed as the Lambeth stoneware or not, or are not glazed at all, is, on this head, no objection to them.

The only remaining point, then, is the porosity of the Aylesford pipes, and their fitness and durability, as they may be effected by it.

As I have before stated, the Aylesford pipes are in a degree porous; from the experiments made by Dr. Letheby and others who have reported upon them, they appear to absorb from 16 to 17 per cent. of their own weight of water. If the pipes were perfectly well glazed all over, the porosity would be closed; but this perfection in the glazing is not attainable without risk of injury to them in other respects, as well as increase in their cost; but were it attained, its removal subsequently from any portion by a blow or chip would in a degree diminish its value, as full imbibition could at once ensue. The only objection that I am aware of that can be raised against their being porous is, they will allow the percolation of the fluid which it is their special object to dischaage without loss, and that their durability will be lessened by allowing chemical action to ensue between the material of the pipes and

the sewerage waters; and objections have upon these grounds been raised, of recent years, against sewers and drains made of bricks and all porous materials.

The objection, if admitted at all, as respects their permeability, and the effect upon their discharging powers, could really only be valid under special circumstances. A town cannot be said to be effectually drained by the mere removal of its foul waters; but the drying of the subsoil is one of the benefits which a perfect system of sewerage should effect. Now, it is found that, where a brick drain is laid in a wet soil, the water-level in the surrounding earth is, within certain limits of distance, reduced to the level of the usual flow on the invert by the water permeating the drain and running off. Were a system of sewers strictly impermeable, this could not result; and it is clear that in such soils permeability, to a certain extent, would be a positive advantage rather than an objection. This, however, is not uniformly the condition of soils in a large portion of the metropolitan area; the water-level is already sufficiently low, and the question is whether, in such localities, porosity such as that of the Aylesford pipes opens them to objections sufficient to justify their interdiction. My opinion is that it does not; for it must be observed, that there is a wide difference between drains formed of these tubes and those formed of bricks, which have a large number of joints either open or formed of mortar or cement, and of which the bricks themselves are frequently more porous than the Aylesford pipes; and it is against these that the objections mainly have been advanced; and, I may add, that the statements which have been rife of late years upon the subject of the effect of porous constructions as drains and sewers have, I think, been greatly exaggerated. The fact is beyond dispute, that, although a great length of the sewers and drains of the metropolis are made of porous materials, with joints wide and open, and generally of very inferior construction—and nearly the whole of its sewerage is formed of bricks set with mortar and cement—yet that more than the full daily quantity of water supplied to the inhabitants of the metropolis runs off by the sewer outlets. Now, with respect to these pipes, it appears to me more than probable that, after full imbibition, no further loss of any fluid running through them will take place, considering the conditions under which they will be usually laid; and, therefore, that there is no cause of fear that their porosity would injuriously affect their delivering powers. And it seems to me that, if permeation did take place, it would in a short time stop the porosity, as the filtering diaphragms are stopped by the passage of waters considered potable even before filtration: and I hazard the opinion, that if sewerage water percolates these tubes, it will be found to have been in a large degree purified.

As regards the durability of the Aylesford pipes, it is stated by chemists that pottery closely analogous in structure and composition is found of great antiquity, and that there is no reason to believe these pipes should have an inferior durability. Without pretending to give more than an opinion formed from general professional experience, and comparison of the structure of these pipes with argillaceous wares of admitted durability, I have no doubts of the pipes being extremely durable; and that, although I cannot imagine that they can be so durable as a vitreous substance, yet that they will last far longer than any edifice beneath which they may be placed; or, considering the wonderful alterations which a century or two appears to produce in the position of roads and public ways, as long as they will be required as public sewers.

It has been objected that acids have an injurious effect upon the Aylesford pipes. Upon this point I do not pretend to give an opinion, but may observe, if this be the case, that when drains are required to carry off acids (which must be exceptional cases), other pipes had better be used. I do not imagine, from what I have seen of the analyses of sewerage waters, that generally they are acid and corrosive in an appreciable degree; but that, on the contrary, they are generally alkaline: their especial tendency would, I apprehend, therefore be, rapidly to close the pores of the tubes, if permeation took place. The question, however, of the effect of sewerage water upon the pipes is of importance, involving, as it does, that of their durability: and this is a matter for the opinion of the professional chemist.

My conclusions, therefore, are:—

That, as regards capability of resisting pressure and percussion—as regards sectional correctness of form and smoothness of internal surface—the Aylesford pipes are well adapted for the purpose of constructing sewers and drains.

That, as regards their internal glazing, it is unimportant, as it affects the flow of water, whether it is improved or not.

That, as regards their porosity, it does not appear to me to be such as to constitute a tenable objection to their usage, under most circumstances, for sewers and house-drains.

And that, in the absence of evidence as to the injurious effects of sewerage water upon them, I should consider them to be sufficiently durable for the purposes intended.—I have the honour to remain, gentlemen,

Your most obedient servant,

WILLIAM HAYWOOD, Engineer.

REPORT TO THE COMMISSIONERS OF SEWERS OF THE CITY OF LONDON, UPON THE REGULATIONS OF PROJECTIONS OF AREA COVERINGS, GRATINGS, ETC.

Sewers' Office, Guildhall, April 22, 1856.

Gentlemen,—Pursuant to reference, I have considered the question of the regulations that should be adopted for the prevention of accidents by the breakage of the slabs of glass now extensively laid down in the footways of the public thoroughfares within your jurisdiction, for lighting the basements of premises, in lieu of the open iron gratings formerly used for that purpose. I have also, as they are cognate in their nature, and in some instances the regulations for one are applicable to all, ventured to extend my considerations to the whole class of openings the coverings of which are permitted to project upon the surface of the public footways.

These projections are area gratings, gratings or frames filled in with slabs of glass or lenses, cellar flaps, and coal-plates; and I beg to recommend that the following be the regulations for their construction:—

AS TO OPEN AND CLOSED AREA COVERINGS.

1. That the maximum projection of all gratings or frames over areas, whether they be open frames or filled in with slabs of glass or lenses, be 12 inches—measuring from the general line of the front of the walls at 1 foot above the ground-level—and the maximum length of each be 6 feet.

2. That where more than one area grating, or other such covering, is permitted in the front of one house or building, the division between each be not less than 9 inches, and be formed by a solid piece of hard stone, not less than nine inches wide and nine inches deep, such stone to be securely pinned into, or to rest upon, the brickwork at each end not less than six inches; that these stone curbs be fixed at the levels of the foot-ways; that the gratings or frames be securely let into the curbs, and be run with lead; and that they be not permitted to open.

3. That, where covered with open iron gratings, the gratings be made with frames or borders; that the bars of the gratings be fixed at right angles with the line of the front of the house, and the space or width between each bar do not exceed one inch and a half; that each bar be not more than three-quarters of an inch in width on the surface, and be not less than one inch in transverse sectional area.

4. That the coverings over areas, where intended to be close or filled in with glass slabs, be formed by iron gratings or frames, the bars not to be more than two inches apart; that the bars of the gratings be fixed at right angles to the line of the house; that each bar have at least one inch of sectional area; and that the spaces be filled in with glass of at least one inch in thickness.

5. That no covering of any material or description be permitted over any area openings, excepting those formed by open iron gratings, or by iron frames filled in with slabs of glass or lenses, as before described, or with York stone landings six inches thick.

AS TO CELLAR-FLAPS.

6. That the maximum projection of the openings to cellars, or cellar-flaps, be 18 inches, measuring from the front line of the wall of the house, at 12 inches above the ground level, and the maximum width of the openings be four feet; that they be surrounded at the foot-way level by curbs made out of hard stone, not less than nine inches wide upon the face; that the flaps be securely fastened from the underside, and be made so as to shut on to ledges or rabbets in stone curbs, and to open outwards.

7. That the coverings of the cellar openings be made of no other wood or material than oak of a sufficient thickness.

8. That there be no fixed staircases or steps permitted beneath the cellar-flaps; and that these openings to basements be not granted for the purpose of giving constant access, but for the occasional purposes of raising and lowering goods, or removal of dust, &c., only; and that they be closed immediately such temporary operations are completed.

AS TO COAL-PLATES.

9. That the coal-plates be circular, and not more than 12 inches diameter; that they be securely let into rabbets cut into the paving-stones, and be formed of iron not less than three-quarters of an inch thick, and deeply chequered on the surface; or, if to give light to the cellars beneath, that they be formed of iron frames, the space or width between the bars being not more than 1½ inch at any point, and that these be filled in with glass lenses; that open iron frames or perforated iron as coal-plates be not permitted.

Having submitted to your consideration the forgoing suggestions, I beg to add some remarks upon the regulations generally, and some of the principal reasons which have influenced me in recommending them.

I cannot but regard the whole of these projections upon the public ways as objectionable, and as constituting, more or less, so many obstructions to the traffic; and I believe, indeed, that investigation of the subject would inevitably lead to this conclusion. They may be, and perhaps, under close restrictions as to projection, and with great care in other respects, are, but trifling obstructions; but it would be difficult, nevertheless, to disprove the proposition, that every one of them, at some time or another, has caused or will cause, in some degree, public inconvenience.

My own views (as I have before expressed them with regard to vaults) are, that it would be better if these projections were not permitted at all, and that public ways, both below and upon the surface, should be dedicated to the public service alone, which I fully believe, as the metropolitan traffic increases, must ultimately be their sole appropriation—at all events, in the larger thoroughfares; but at present—so much has the construction of London houses been designed with the certainty of such projections being permitted—so much have basements and ground floors been adapted in relation to these easements (so to call them) upon the public ways, that it would be felt extremely hard to refuse them altogether; and it may be expedient, therefore, as yet to permit them to some extent; but at the same time, if the truth of what I have advanced is conceded, restrictions should be imposed upon them as great as may be practicable, without actually rendering them valueless for the object sought. For some years past, all projections within your jurisdiction have been gradually restricted, until at the present time, in the majority of instances, not one-half the projection is permitted that was allowed ten years ago; and, by continuing this course, and making the regulations respecting them gradually more stringent, public convenience will be consulted; and at any future day, should the suppression of such projections be deemed necessary, it may be thought less oppressive, as the architects of premises will by degrees customarily so design their buildings as to be independent for light, ventilation, and access, of such projections upon the public ways.

OPEN AND CLOSED AREA COVERINGS.

RULE 1.—This has been practically the regulation for some years past within the City, but the existing standing orders of the commission permit 15 inches projection, which is occasionally granted. Now, the projection of gratings constitutes one of their greatest public inconveniences, and a projection of 12 inches appears to me a liberal grant of the public way, whatever may be the nature of the thoroughfare in which the grating may be required.

RULE 2—Is for obtaining security in the fixing of the gratings over which the public have to pass, and preventing the usage of the gratings as cellar flaps. When allowed to open, iron gratings, after having been in use some time, rarely close firmly, but move very unpleasantly under the feet.

RULE 3—Is for the purpose of obtaining secure footing for pedestrians, for diminishing the chances of fracture of the gratings, and accidents therefrom, and the prevention of the usage of the flagging of the pavements for the support of the gratings.

RULE 4.—The object of this recommendation is to prevent all chance of accident by the breakage of slabs of glass in the pavements; but I feel much difficulty in framing a regulation upon this head which shall not be deemed oppressive. My opinion however is, that there will be no full security against accident unless the width between the bars or compartments of the frame holding the glass is such that, if the glass be broken or removed, the foot of an adult cannot slip through. It may be considered that placing glass of considerable thickness will give sufficient security against this; but, although the thicker the glass is the greater undoubtedly will be the chances against its being broken, yet thicknesses up to 1 inch have not prevented breakages hitherto; and this will be seen by referring to the appended list, which shows the whole of the slabs of glass in area coverings, upon the public ways within your jurisdiction, which are cracked or broken at the present time.

It may be said, that by the regulation proposed, the light obtained will be diminished, and the expense to the owner increased. This is true—but in framing the regulation I considered mainly the public safety: neither does it appear to me that, when a private advantage is sought from the usage of a portion of the public way, the expense attendant on obtaining it should be allowed to weigh against the demand for the public safety;

and with regard to the quantity of light, by the use of glass semi-spherical or convex upon its under-side, much additional light may be obtained, but certainly not so much as would be thrown by single large slabs of glass.

RULE 5—Is a measure against the introduction of materials which in any way may affect the public safety.

CELLAR-FLAPS.

RULE 6—Is merely a diminution in the projection of the openings of cellar-flaps from 24 inches—which is the present maximum projection—to 18 inches. As with area gratings, the public inconvenience caused by a cellar opening is in proportion to its projection from the front lines of the houses.

RULE 7—Is to prevent the use of iron or other material likely to become highly slippery.

RULE 8—Will, I think, sufficiently explain its own object.

COAL-PLATES.

RULE 9.—Coal-plates are, in muddy or frosty weather, the source of much inconvenience in the streets of the metropolis, even when their surfaces are chequered; but they are dangerous when the iron is perfectly smooth. Of late years these plates have at times been made as frames for glass, so as to light the cellars; and when the glass has been broken (which very frequently has been the case), holes dangerous by their size have been left. By the regulation proposed, foot-hold will be given to pedestrians; and, if the glass in the plates formed with it are broken, the probability of accident will be remote. In some cases these plates are made perforated, for ventilation. As regards foot-hold, when the perforations are small, there is no objection to this; but they are a source of annoyance to pedestrians, whose sticks and umbrellas go into them, and by that means are broken frequently: this is, however, the only objection which I am aware of that can be urged against them, and it may be a question how far it may justify their prohibition. I may observe, however, that these coal-cellars mostly open into areas which are well ventilated by area gratings; and that, therefore, the necessity for additional ventilation in the middle of the footways (where coal-plates unfortunately are chiefly placed) is rarely needed.

I beg to append a list, arranged from returns made to me by the district inspectors, showing the situations, size, thickness, and other conditions of the whole of the glass broken or cracked in the area coverings in the public ways of the City; and

I have the honour to remain, gentlemen,
Your most obedient servant,
WILLIAM HAYWOOD, Engineer and Surveyor.

RATING OF TELEGRAPH COMPANIES.—The Magnetic Telegraph Company, through their Liverpool secretary, Mr. Bright, appealed on Wednesday, before the Liverpool magistrates, against the assessment made upon them for their Liverpool offices. They were assessed, it appeared, on a presumed rental of £500 a year, and also a sum of £25 for about a mile and a half of wires which passed through some of the streets. Mr. Bright stated that the offices belonged to the proprietors of the Stock Exchange, and that, though the Magnetic Company only occupied about one-third of the whole building, the rest being used for the Stock Exchange, they were assessed upon an amount £100 more than the Stock Exchange. In answer to a question, Mr. Bright admitted that the actual rent paid by the Magnetic Company to the Stock Exchange proprietors was £700 a year, but he stated that one condition of this payment was, that they were to have a monopoly of the Stock Exchange business. The magistrates, after hearing the case, confirmed the previous rate. In the case of the wires, which it was urged could not have any rateable value, a reduction was made from £25 to £1.

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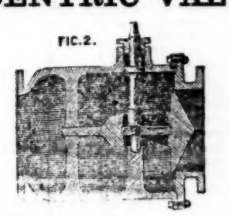

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Old Barge Iron Wharf, Upper Ground-street,
LONDON.

JUDKIN'S Improved Gas Regulator has the following advantages to recommend it to the consideration of all gas consumers:—1. It can be easily adjusted to supply gas at any required pressure below that of the street. 2. When once adjusted, it will admit of no variation in lights burning, whether they are few or many, whatever the fluctuation of pressure may be. 3. The light being purer by perfect combustion, the atmosphere is more healthy and agreeable. 4. A saving of at least from 25 to 35 per cent. in the consumption of gas is obtained. Its advantages over any other regulator are as follows:—1. It is more simple in its construction. 2. It is more sensitive in its operation, having less friction, as it works only on two steel centres, which are immersed in quicksilver. 3. It is not liable to get out of repair, and requires less attention than a meter itself. N.B.—A Testing Apparatus has been fitted up on the premises of the patentee, 33 and 35, Corporation Street, MANCHESTER; and 98, Fleet Street, LONDON, for the purpose of demonstrating the above facts.

CARTER'S PATENT SAFETY GAS VALVES.

THOMAS LAMBERT and SON,
PATENTEES AND MANUFACTURERS,
SHORT STREET, NEW CUT, BLACKFRIARS, LONDON.

The Bank of England is fitted entirely with these Valves, from the smallest branch to the largest main pipe.

The following, among numerous testimonials, will be found very satisfactory:—

"The British Gaslight Company's Office, No. 105, Broad-street, Ratcliff, London, June 10, 1846.

"Gentlemen,—In reply to your inquiry, I have to state that 'Carter's Patent Gas Valve' has been used by this company and by the fitters of the district extensively for seven years past. It was adopted to obviate the inconvenience of setting fast, so prevalent with the conical metal plug-cocks, and has been found to answer the purpose intended.

"I have recommended its use in several provincial towns with which I am professionally connected, and have not received any complaint of its having failed in any respect of performing satisfactorily all that is required of it.—I am, gentlemen, yours respectfully,
"GEDDIE PEARSE.

"Messrs. Lambert and Son, Lambeth."

Share List.

(Directors and Managers of Gas Works are earnestly requested to enable us to rectify the errors and fill up any omissions in the following List.
The Companies whose names are printed in italic type are incorporated by Act of Parliament.

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£	**ENGLAND.**	£ s. d	£ s. d	£ s. d
		Aberdare			
		Abergele			
		Aberystwith			
		Abingdon			
1050	10	*Accrington*	10 0 0	7 0 0	15 10 0
		Albrighton			
		Alcester			
		Alford			
		Alfreton			
		Alnwick			
		Alston Moor			
250	10	Alton	10 0 0	5 0 0	10 0 0
800	5	Altrincham	5 0 0	6 0 0	6 0 0
		Amersham			
170	10	Ampthill	10 0 0	5 0 0	10 0 0
350	10	Andover	10 0 0	5 0 0	11 0 0
330	5	Appleby	5 0 0	3 0 0	2½ to 2¾
		Arundel			
		Ashbourn, Derby			
292	5	Ashburton	5 0 0	5 0 0	
		Ashby-de-la-Zouch			
		Ashford, Kent			
1600	30	*Ashton-under-Lyne*	30 0 0	10 0 0	60 0 0
		Atherstone			
		Axminster			
200	20	Aylesbury	20 0 0	5 0 0	21 0 0
		Aylsham, Norfolk			
		Bacup, Lancashire			
		Bakewell			
200	10	Baldock	10 0 0	5 0 0	10 0 0
1000	10	Banbury	10 0 0	5 0 0	10 10 0
		Bangor			
500	5	Barking, Essex	5 0 0	5 0 0	5 5 0
260	10	Barnard Castle	10 0 0	5 10 0	10 15 0
		Barnsley £6000		7 10 0	
100	20	Barnstaple	20 0 0	5 0 0	23 0 0
1158	2	Barton-on-Humber	2 0 0	5 0 0	2 0 0
120	25	Basingstoke	25 0 0	7 0 0	35 0 0
2500	20	*Bath*	16 0 0	10 0 0, 6 0 0	30 to 32
		Battle £2000			
56	26½	Bawtry	26 10 0	5 0 0	25 0 0
		Beccles (& Water)			
300	30	Bedford	25 0 0	4 0 0	20 0 0
200	10	Bedworth	10 0 0	5 0 0	11 0 0
		Belford			
		Bedale, Yorkshire			
		Belper			
		Beminster			
420	5	Berkhempstead	5 0 0	6 0 0	6 0 0
700	10	Berwick-on-Tweed	10 0 0	6 0 0	12 0 0
		Bewdley			
280	10	Bideford	10 0 0	6 0 0	10 10 0
		Biggleswade			
170	10	Bicester	10 0 0	6 0 0	11 5 0
		Bilston £15,100	5 0 0	7 0 0	6 10 0
		Billericay			
		Bingham			
		Bingley £7400		4 0 0	
		Birkenhead £70,000	35 0 0	3 0 0	35 to 37
2400	50	*Birm. & Staffordsh.*	50 0 0	10 0 0	95 to 96
2400	25	*Ditto*, new shares	10 0 0	10 0 0	15 to 16
928	75	*Birmingham*	75 0 0	10 0 0	156 to 158
		do. 1-10 shares			15 to 16
		Bishop's Auckland			
230	10	Bishop's Stortford	10 0 0	5 0 0	10 0 0
3000	15	*Blackburn*	15 0 0	10 0 0	25 0 0
		Blandford			
		Blyth			
		Bodmin			
		Bognor			
3909	16⅔	*Bolton*	16 10 0	9 19 8	35 0 0
7466	16	,, new	1 0 0		
		Boroughbridge			
160	50	*Boston*	50 0 0	10 0 0	75 0 0
200	10	Bourn	10 0 0	5 0 0	10 0 0
160	10	Brackley	10 0 0		
		Bradford, Wilts			
	25	,, *Yorks.* £45,000	25 0 0	10 0 0	49 0 0
		Bramptn, Cumblnd			
		Brandon, Suffolk			
		Brecon			
		Bridge-end, Glam.			
6000	5	*Brierly Hill*	5 0 0	4 0 0	5 2 6
		Brighouse			
2250	20	*Brighton*	20 0 0	5 0 0	15 to 16
1125	0	,, new shares	16 0 0	5 0 0	10 to 12
2471	20	*Brighton and Hove*	20 0 0	3 10 0	
107	8	,, new shares			
172800	Stk.	*Bristol United*	Stock	8 0 0	170 to 175
154	8	Brixham	8 0 0	5 0 0	5 to 6
		Braintree			
750	50	*Brentford*	50 0 0	5 10 0	48 to 50
800	25	,, new shares	11 0 0	5 10 0	11 0 0
		Brentwood			
200	30	*Bridgwater*	30 0 0	5 0 0	30 0 0
400	10	Bridlington	10 0 0	7 10 0	10 0 0
		Bridport			
		Brigg			
		Broadstairs			
		Bromsgrove			
		Bromley (Kent)			
		Broughton			
120	10	Bruton	10 0 0	4 0 0	8 0 0
		Brynmawr			
160	25	Buckingham	25 0 0	6 0 0	28 0 0
		Burslem & Tunstall			
		Burton-on-Trent			
		Bury, Lanc. £6570			
		Bury St. Edmund's		5 0 0	
200	10	Buxton	10 0 0		
		Callington			
		Calne, Wilts			
		Camborne			
	50	*Cambridge* £34,560	50 0 0	7 0 0	76 0 0
240	50	*Canterbury*	50 0 0	6 0 0	61 to 63
240	25	,, 2nd iss	25 0 0	6 0 0	30 to 31
240	12½	,, 3d iss.	12 15 0		
240	6¼	*Canterbury*, 4th iss.	6 5 0		
800	25	*Cardiff*	25 0 0	7 10 0	34 0 0
		Carmarthen			
		Carshalton			
		Castle Cary			
249	5	Castleford	5 0 0	5 0 0	5 0 0
300	5	Castletown (Man)	2 0 0		
		Chapel on the Frith			
		Chard			
		Chatteris			
255	10	Cheadle	10 0 0	5 0 0	10 0 0
100	25	Chelmsford	25 0 0	5 0 0	40 0 0
100	25	,,	15 0 0	5 0 0	15 0 0
		Cheltenham £18,732		9 0 0	
		Chepstow			
230	10	Chesham, Bucks	10 0 0	5 0 0	10 0 0
		Chester			
250	5	Chester-le-Street	5 0 0	6 0 0	5 0 0
		Chesterfield £13,123		4 17 6	
240	25	Chichester	25 0 0	6 0 0	30 0 0
		Chippenham			
		Chipping Norton			
100	10	Chipping Ongar	10 0 0	2 10 0	5 0 0
		Chorley			
		Chowbent (Lanc.)			
		Christchurch			
		Cirencester			
		Clare (Suffolk)			
		Cleckheaton, York.			
		Clitheroe			
750	4	Cockermouth	4 0 0	7 0 0	5 0 0
		Colchester			
		Collumpton			
		Colne, Lancashire			
		Coleford, Gloucest.			
300	5	Coggeshall	5 0 0	3 0 0	3 0 0
200	25	*Congleton*	25 0 0	5 0 0	31 0 0
		Conway			
		Cowbridge			
		Corsham			
800	25	*Coventry*	25 0 0	6 0 0	30 0 0
		Cowes			
300	5	Crowland			
		Crowle (Lincoln.)			
		Croydon £20,000		5 0 0	
		Cranbrook £1900		5 0 0	
		Crayford & Bexley			
420	5	Crediton	5 0 0	5 0 0	6 0 0
		Crewe, Cheshire			
		Dalton			
		Darlaston			
		Darlington & Water			
250	20	Dartford	20 0 0	7 10 0	27 0 0
125	20	Daventry	20 0 0	6 0 0	24 8 0
		Dawley, Salop			
346	5	Dawlish	5 0 0	8 0 0	7 10 0
		Deal			
1200	1	Deddington	1 0 0		
		Delph (Yorkshire)			
500	6	Denbigh	6 0 0	5 0 0	6 0 0
820	10	*Deptford*	10 0 0		1 to 2
	25	*Derby*	25 0 0	10 0 0	50 0 0
90	20	Dereham (East)	20 0 0	5 0 0	21 0 0
4000	5	*Dewsbury*	5 0 0	7 0 0	8 12 6
		Devizes			
7000	5	*Devonport*	5 0 0	6 0 0	7 10 0
		Dolgelly			
280	25	Dorchester	25 0 0	5 0 0	30 0 0
120	25	Dorking	24 0 0	5 0 0	25 0 0
192	25	Douglas, Isle of	25 0 0	8 0 0	30 0 0
209	56¼	*Dover* [Man	56 10 0	5 15 0	71 to 72
25	60	Downham	60 0 0	7 10 0	
		Driffield			
		Droitwich			
600	20	*Dudley*	20 0 0	5 0 0	28 to 30
		Droylsden			
		Dukinfield			
		Dunmow			
250	10	Dunstable	10 0 0	5 0 0	8 0 0
		Durham			
276	9	Dursley, Gloster	9 0 0	5 10 0	8 0 0
300	10	Eastbourne			
		East Grinstead			
		Egremont, Cumbld			
703	6¼	Elland	6 10 0	8 0 0	10 0 0
		Ellesmere			
200	10	Emsworth			
400	5	Enfield	5 0 0	5 0 0	5 0 0
300	19	Epsom and Ewell	19 0 0		
		Eton (Cannel Gas)			
		Evesham			
1600	25	*Exeter*	25 0 0	8 0 0	40 to 42
		Exmouth			
		Eye, Suffolk			
150	10	Fairford	10 0 0		
64	25	Fakenham	25 0 0	5 0 0	25 0 0
		Falmouth			
100	30	Fareham	30 0 0	2 10 0	30 0 0
120	25	Farnham	25 0 0	10 0 0	42 0 0
		Farringdon			
		Faversham			
		Ferry Hill (Durhm.)			
5		Filey	5 0 0	5 0 0	5 0 0
		Fleetwood			
300	10	Folkestone	10 0 0	10 0 0	15 0 0
240	10	,, new shares	8 0 0	10 0 0	13 0 0
		Fowey			
		Fordingbridge			
240	5	Framlingham	5 0 0	5 0 0	5 10 0
		Frome			
		Gainsborough			
		Gillingham, Dorset			
		Glastonbury			
		Glossop £10,000		9 0 0	
1000	25	*Gloucester*	25 0 0	7 10 0	28 0 0
516	5	Gomersal	5 0 0		
		Godalming			
350	£10	Gorleston & South-Gosport [down	£ s. d 2 10 0	£ s. d	£ s. d 2 10 0
450	20	Grantham	20 0 0	7 0 0	28 0 0
1000	20	Gravesend	20 0 0	5 0 0	21 0 0
		Grays Thurrock			
1000	10	*Great Grimsby*	9 10 0	8 0 0	13 to 14
		Great Torrington			
	25	Guildford	25 0 0	4 0 0	20 0 0
		Guisborough			
		Hadleigh			
		Hailsham			
		Hales Owen			
360	5	Halesworth	5 0 0	7 10 0	5 10 0
600	25	*Halifax*	25 0 0	10 0 0	48 0 0
		Halstead			
		Hampton Court			
1000	10	*Harrogate*	6 5 0	5 0 0	6 5 0
	5	*Hartlepool* £15,137	5 0 0	7 10 0	7 12 6
		Harwich			
540	6	Haslingden, Lansh	6 0 0	7 10 0	6 0 0
330	50	*Hastings and St. L.*	50 0 0	7 0 0	60 0 0
500	5	Havant			
		Haverhill			
		Haworth, Yorks			
		Hay (Brecon)			
		Hayle			
4965	1	Hebden Bridge	12 6		15 0
		Helstone			
250	10	Hemel Hempstead	10 0 0	4 0 0	6 10 0
300	10	Henley-on-Thame	10 0 0		
		Hereford £5300		4 0 0	
300	10	Herne Bay	10 0 0	6 0 0	11 0 0
270	10	Hexham	10 0 0	7 0 0	12 0 0
400	25	*Heywood*		7 10 0	
		Higham Ferrers			
520	5	High Wycombe	5 0 0	6 0 0	6 16 0
		Highworth (Wilts)			
280	10	Hinckley	10 0 0	5 0 0	9 0 0
		Hindley, Lancash.			
200	20	Hitchen	20 0 0	5 0 0	20 0 0
100	10	Hythe & Sandgate	10 0 0	6 0 0	11 0 0
		Hoddesden			
		Holbeach			
		Holmfirth £8880		3 10 0	
		Holyhead			
		Holywell (see Brit.			
95	25	Honiton [Prov.	25 0 0	4 0 0	17 0 0
		Horbury			
6	500	Horncastle	500		
1200	2½	Horsforth	2 10 0		2 10 0
128	20	Horsham	20 0 0	5 0 0	
	10	Houghton-le-Sprg.	10 0 0	8 0 0	
		Howden [B.P.]			
		Hull, Sculcoats (see		5 0 0	
		Hull, £11,712. 10s.			
210	10	Hungerford	10 0 0	5 0 0	16 0 0
		Huddersfield			
		Huntingdon			
		Hyde (Cheshire)			
		Idle and Eccleshill			
400	6¼	Ilkeston	6 5 0	3 10 0	6 5 0
		Ilminster			
		Ilford			
		Ilfracombe			
		Ironbridge			
2800	10	*Ipswich*	10 0 0	7 0 0	14 0 0
800	25	*Isle of Thanet*	20 0 0	5 0 0	20 to 21
		Kendal £9100		8 15 0	
300	10	Kenilworth	7 10 0		7 10 0
400	5	Keswick	5 0 0	4 5 0	4 4 0
140	25	Kettering	25 0 0	5 0 0	25 0 0
		Kiddermins. £10000		5 0 0	
		Kimbolton			
		Kingsbridge			
		King's Langley			
		Kingston-on-Thms			
		Kington, Hereford			
		Kirkby Lonsdale			
		Kirkham, Lanc.			
		Knighton			
		Knutsford			
		Lancaster			
		Llanelly £3000		5 0 0	
		Llandovery			
1000	20	*Leamington Priors*	20 0 0	8 0 0	25 0 0
250	20	,, new	15 0 0	5 0 0	17 0 0
160	10	Leatherhead	10 0 0		
		Ledbury			
		Leeds Old Comp.			
	25	old stk., £60,300	25 0 0	10 0 0	46 to 47
	25	new ,, £23,775	25 0 0	6 0 0	29 to 30
	25	*Leed's New* £60,000	20 0 0	10 0 0	36 to 38
3623	10	*Leicester*	10 0 0	8 0 0	16¼ to 16¾
		Leigh (Lancashire)			
135	20	Leighton Buzzard	20 0 0	7 0 0	21 0 0
400	10	Leominster	9 0 0	5 0 0	8 0 0
		Leyburn, Yorksh.			
240	5	Liskeard	5 0 0	8 0 0	6 0 0
350	25	Lewes	25 0 0	5 0 0	25 0 0
320	25	*Lincoln*	25 0 0	10 0 0	48 0 0
		Leyland, Lancash.			
240	5	Littlehampton	5 0 0	7 10 0	5 0 0
250	50	Lichfield	20 0 0	10 0 0	35 0 0
		Liverpool United	100 0 0	10 0 0	182 to 186
		,, ¼ sh.	25 0 0	10 0 0	47¼ to 47¾
50	25	Langport	25 0 0	4 0 0	15 0 0
		London Comps.—			
5000	10	Anglo-Romano	10 0 0	4 0 0	
5000	20	British Provincial	20 0 0	7 0 0	22 to 24
	20	,, Prov., new	16 0 0	7 0 0	17 to 18
	25	*Commercial*	25 0 0	6 0 0	25 to 27
4000		,, new shares	2 10 0	6 0 0	par to 1pm
20.0	25	*Chartered*	50 0 0	6 0 0	56 to 57
12,000	50	,, new shares	10 0 0	6 0 0	10¼ to 11
6000	50	*City of London*	150 0 0	3 0 0	96 to 100
2000	150	*Equitable*	50 0 0	4 0 0	34 to 35
4000	50	,, deb. £47,600			
12,000	20	European	20 0 0	5 & bonus	14 to 15

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
16,500	10	*Gt.Cntl.Consumers* deb. £66,000	10 0 0	8 0 0	11 to 11¼
8000	50	*Impl. Continental* —First capital (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam).....	42 0 0	6 11 0	40 to 45
7000	50	Second capital— (Aix la Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Marseilles, Toulouse Vienna)	41 0 0	10 7 0	65 to 70
	50	Third capital ...	43 10 0	9 4 0	65 to 67
13,000	50	*Imperial*	50 0 0	10 [illegible]	88 to 90
13,000	50	„ (new).....	10 0 0	10 0 0	25 to 26
		„ Bonds 130,000	10 0 0	10 0 0	22 to 22½
4000	40	*Independent*	40 0 0	6 0 0	48 to 50
5000	50	*London*	50 0 0		5 0 0
1000	50	„ (red)	50 0 0		
2000	50	„ (blue).....	50 0 0	3 0 0	15 to 18
6000	25	„ (preference)	25 0 0	6 0 0	25 to 26
50,000	1	Oriental (Calcutta)	1 0 0		1 to 1½
9000	50	*Phœnix*	49 0 0	5 0 0	41 to 42
5000	20	*Ratcliff*	16 0 0	5 0 0	16 0 0
4000	50	*South Metrop.*	29 0 0	6 0 0	30 to 31
7000	10	*Surrey Consumers'*	10 0 0	8 0 0	10½ to 11
9000	50	UnitedGenl.(Cork, Dublin, Limerick)	50 0 0	2 0 0	19½ to 20
	10	Western	10 0 0	3 10 0	7 to 7½
		Littleborough			
		Lostwithiel			
		Loughborough.....			
240	25	*Louth*.....	25 0 0	6 0 0	26 10 0
2500	10	*Lowestoft(&Water)*			
		Llangollen			
611	5	Ludlow Union.....	5 0 0	5 0 0	5 0 0
		Luton.....			
		Lutterworth.....			
63	20	Lyme Regis	20 0 0	4 0 0	20 0 0
120	25	Lymington	25 0 0	5 0 0	25 0 0
200	10	Malmesbury.....	10 0 0	2 10 0	5 15 0
		*Macclesfield*32,000			
		Maidenhead.....			
360	50	*Maidstone*.....	50 0 0	10 0 0	90 0 0
160	40	Maldon	33 0 0	5 10 0	24 0 0
		Marlborough			
		Malton (New).....			
		Manningtree			
		Mansfield £5000		10 0 0	
150	10	Manefield Wood-	10 0 0		
		March .....[house			
		Margate(see Lof T.			
		Market Deeping ...			
		Market Drayton ...			
132	25	Market Harboro'	25 0 0	6 0 0	34 0 0
		Market Raisin.....			
		Market Weighton			
210	10	Marlow	10 0 0	5 0 0	10 0 0
370	10	Maryport	10 0 0	6 0 0	12 0 0
500	5	Matlock Baths.....	5 0 0		
		Melksham.....			
		Melton Mowbray .			
		Merthyr Tydvil ...			
50	10	Mere	10 0 0		
		Middleton £9039		5 0 0	
		MidsummerNorton			
		Middlesboro'			
198	5	Mildenhall	5 0 0	5 0 0	5 0 0
700	10	Mitcham	10 0 0	10 0 0	14 10 0
650	5	Mold (and Water)	5 0 0	6 0 0	6 10 0
700	10	Monmouth	10 0 0	5 0 0	
		Monk Wearmouth			
150	10	Moreton in Marsh	10 0 0	3 10 0	
		Morley (nr. Leeds)			
		Mossley.....			
		Mottram			
220	16	Morpeth	16 0 0	5 0 0	17 10 0
		Nantwich			
		Neath.....			
183	10	Needham Market..	10 0 0	4 0 0	
		Newark..... £5000		10 0 0	
250	20	Newbury...[Union	20 0 0	5 0 0	20 0 0
13,000	5	Newcastle&Gatshd	5 0 0	8 0 0	7 12 6
		Do. un.Lyne£6300		4 0 0	
600	5	Newmarket	5 0 0	6 0 0	5 0 0
250	5	Newent	5 0 0		
		Newhaven(Sussex)			
		New Mills £2115			
		Newport,M.£11720		8 0 0	
320	50	*Newport, Isle of W.*	38 0 0		5 0 0
		Newport Pagnell			
		Newport, Salop ...			
		New Romney			
		Newton Abbot.....			
		Newton, Lanc.....			
		Newtown(Mntgom.			
		Northallerton			
120	10½	North Walsham ...	10 10 0	5 0 0	10 10 0
542	20	*Northampton*	18 0 0	10 0 0	31 0 0
		Northwich [40000]			
		Norwich (see B. P.		7 0 0	
900	50	*Nottingham*	50 0 0	10 0 0	
960	50	New shares		10 0 0	
		Nuneaton			
		OakenGates(Salop)			
170	10	Oakham.....	10 0 0	4 10 0	8 10 0
		Oakhampton			
200	10	Odiham, Hants.....	10 0 0	4 0 0	10 0 0
		Olney			
658	10	*Ormskirk*	7 10 0	5 0 0	
		Ossett.....			
		Otley, Yorkshire...			
80	25	Oundle	25 0 0	7 0 0	25 0 0
120	150	*Oxford*	150 0 0	6 10 0	230 0 0
		Over Darwen£8000		5 0 0	
		Padiham			
		Padstow			
		Pately Bridge,Yrk.			
		Peeltown (Man) ...			
		Pembroke.....			
20		Penrith	15 0 0	6 10 0	21 0 0
		Penryn			
		Penzance			
200	10	Petworth	10 0 0	9 10 0	14 15 0
320	5	Petersfield	5 0 0	4 0 0	5 0 0
		Pickering			
3000	10	*Plymouth*	10 0 0	8 0 0	18 0 0
		Pocklington.....			
		Pontefract.....			
		Pontypridd		4 0 0	
400	10	Poole	10 0 0	5 0 0	10 0 0
		Port Madoc.....			
600	50	*Portsea Island* ...	53 0 0	5 0 0	50 to 51
		Potton (Beds)			
400	10	Prescott.....	9 0 0	4 13 4	7 0 0
3000	20	*Preston*	20 0 0	10 0 0	44 0 0
		Pudsey ...£12,000		5 0 0	
		Pwllheli.....			
		Quordon &Montsrl			
		Radcliff and Pilkington £9000		4 12 10	
		Ramsay, I. of Man			
		Ramsgate(seeI.ofT			
1000	10	*Reading*.....	10 0 0	4 0 0	7½ to 8
500	20	*Reading Union* ...	20 0 0	4 0 0	16 0 0
		Redditch			
		Redruth.....			
		Reigate			
		Retford (East).....			
		Rhyl			
		Richmond(Surrey)			
400	5	Rickmansworth ...	5 0 0		5 0 0
180	10	Ringwood	10 0 0		10 0 0
		Ripon.....			
		Roches. & Chatham		6 0 0	
		Rochford [£20,000			
		Rockingham.....			
		Romford			
		Ross			
245	25	*Rotherham*	25 0 0	6 0 0	38 to 39
	12½	do. Half Shares	12 10 0	6 0 0	19 to 19½
		Royston.....			
		Rugby			
500	10	Rugeley.....	8 10 0	5 0 0	10 10 0
		Runcorn... £11,000		7 10 0	
		Ruthin			
500	10	Ryde	10 0 0	6 0 0	12 0 0
		Romsey			
		Saddleworth.....			
185	22	Saffron Walden ...	22 0 0	4 0 0	19 0 0
		St. Alban's			
		St. Austel			
		St. Asaph			
		St. Colomb			
		St. Helen's £7500		7 10 0	
		St.Helier's(Jersey)			
		St. Ives, Hunting.			
		St. Ives, Cornwall			
250	10	St. Neot's	10 0 0	8 0 0	12 0 0
		St.Peter's Pt., Guer			
320	25	Salisbury.....[nsey	25 0 0	6 0 0	28 to 30
317	10	Sandbach	10 0 0	5 0 0	12 0 0
140	10	Saxmundham	10 0 0	5 0 0	10 0 0
		Scarborough.....	10 0 0		13 0 0
201	5	Sedburgh	5 0 0	2 10 0	4 15 0
300	16	Selby	16 0 0	5 0 0	16 0 0
		Settle			
296	10	Sevenoaks.....	10 0 0	4 0 0	10 0 0
250	10	Shaftesbury.....	10 0 0	3 0 0	9 0 0
5400	25	*Sheffield United* ...	24 0 0	7 10 0	29 to 30
		Shelton,Pott.(s.B.P			
		Shepton Mallet ...			
5		sherborne.....	5 0 0	5 0 0	5 0 0
2914	5	shields (Tynemth.	5 0 0	5 0 0	5 17 6
		shields (South) ...			
		Shiffnal, Salop			
1000	5	*Shipley*	5 0 0	6 0 0	7 10 0
159	10	Shipston-on-Stour	10 0 0	5 0 0	10 0 0
		shoreham			
		Shrewsbury£10,000		7 0 0	
400	10	Skipton	10 0 0	4 0 0	11 0 0
		Sleaford			
250	10	Slough	10 0 0		
		Snaith			
		Soham			
400	5	Southam	5 0 0		
		Southend, Essex..			
360	5	Southwold [Bdge)	5 0 0	5 0 0	5 0 0
2000	5	South Essex (Lea			
		South Molton			
1000	50	*Southampton*	32 0 0	5 0 0	
220	10	Southwell	10 0 0	4 0 0	
		Sowerby, Yorksh.			
		Spennymoor(Dur.)			
		Spittal (Berwick-			
400	5	Spilsby [on Tweed)	5 0 0		
		Staindrop			
750	5	Stretford	5 0 0	6 0 0	5 0 0
		Stokesly.....			
		Stafford £10,000		5 0 0	
		Staines and Egham			
		Staley Bdg.£15,000		10 0 0	
225	50	*Stamford*	50 0 0	4 0 0	48 0 0
300	5	Stevenage	5 0 0		5 0 0
840	9½	*Stockton-on-Tees*	9 10 0	9 0 0	11 to 12
1600	10	Stoke-upon-Trent	10 0 0	7 0 0	12 15 0
500	10	„ new shares	8 0 0	7 0 0	10 10 0
		Stone, Stafford.....			
		Stoney Stratford ...			
		Stourbridge			
		Stowmarket.....			
150	20	Stratford-on-Avon	20 0 0	7 10 0	30 0 0
		Stroud			
169	10	Swaffham.....	10 0 0	5 0 0	5 10 0
		Swansea £9000			
		Sudbury.....			
		Sunderland, old.....			
6400	5	*Sunderland*, new ..	5 0 0	6 0 0	6 12 6
200	10	Sutton Coldfield ...	10 0 0		
		(Sutton Surrey).....			
250	10	Sutton-in-Ashfield	10 0 0	5 0 0	10 0 0
		Sutton Southcoates & Drypool (Hull).	20 0 0		23 to 24
		Swindon.....			
1600	10	Sydenham.....	10 0 0		
2800	5	*Taunton*.....	5 0 0	6 0 0	6 0 0
		Tadcaster			
		Tamworth.....			
		Tavistock.....			
200	5	Tenbury.....	5 0 0	5 0 0	5 0 0
		Tenby.....			
150	10	Tenterden.....	10 0 0	4 0 0	8 0 0
		Tetbury, Gloster..			
		Tewkesbury			
200	10	Thame	10 0 0	5 0 0	10 0 0
230	10	Thetford	10 0 0	6 0 0	10 10 0
		Thirsk			
		Thornbury			
		Thorne.....			
111	10	Tiverton	10 0 0	10 0 0	17 to 18
1141	5	Todmorden	5 0 0	5 0 0	6 0 0
600	2½	Topsham	2 10 0		3 0 0
		Torquay.....			
		Torrington, Devon			
		Totnes			
		Totnes Consumers			
4000	5	Tottenham	3 15 0	8 0 0	4 0 0
		Towcester.....			
		Town-Malling.....			
225	10	Tring	10 0 0	5 0 0	10 0 0
		Trowbridge (see			
75	50	Truro ...[Brit. P.)	50 0 0	5 0 0	
		Tunbridge.....			
		Tunbridge Wells...			
		Tuxford			
		Tyldesley, Lanca-			
		Ulverston ... [shire			
		Uppingham			
240	5	Upton-on-Severn	5 0 0	5 0 0	5 0 0
		Usk.....			
		Uttoxeter.....			
		Uxbridge			
		„ & Hillingdon			
		Ventnor .. [Cons.			
1000	25	*Wakefield*, old capl	25 0 0	8 0 0	35 0 0
1600	5	„ new „	5 0 0	8 0 0	7 0 0
		Wallasey.....			
300	10	Wallingford	10 0 0	5 0 0	8 0 0
994	10	Wandsworth.....	10 0 0	5 0 0	11 0 0
200	10	Wantage.....	9 0 0	5 0 0	10 10 0
	20	*Warrington* £23304	20 0 0	10 0 0	28 to 29
100	10	Wareham	10 0 0	3 10 0	8 0 0
		Warkworth			
120	25	Warminster	25 0 0	5 0 0	27 0 0
		Warth			
		Warwick £15,000		6 0 0	
		Watford.....			
111	25	Welchpool, Mntgy.	25 0 0	5 0 0	25 0 0
		Wellingborough ...			
100	24	Wellington, Salop	24 0 0	7 10 0	24 0 0
		Wellington,Somers			
160	25	*Wells, Smrst.*£5000	25 0 0	10 0 0	32 to 34
		Westbury.....			
		Weston-sup.-Mare			
2600	5	West Ham	5 0 0	5 0 0	5 0 0
		Wetherby			
		Weymouth			
		Whitby			
		Whitehaven			
		Whitstable			
250	10	Whittlesea.....	10 0 0	5 0 0	11 0 0
1216	10	*Wigan*	10 0 0	10 0 0	22 0 0
		Wigton (Cumberl.)			
		Willenhall.....			
		Wilton			
141	10	Winslow	10 0 0	5 0 0	10 0 0
240	10	Wimborne Minster	10 0 0		
600	10	Wimbledon	8 0 0		8 0 0
		Wincanton.....			
380	50	Winchester	50 0 0	5 0 0	50 0 0
900	12½	Windsor.....	12 10 0	10 0 0	23 0 0
		Witham.....			
		Witney			
4480	10	*Wolverhampton* ...	10 0 0	9 0 0	19 to 19½
4480	10	do. new shares	1 5 0	9 0 0	4 5 0
		do. deb. £10,000			
200	10	Woburn.....	10 0 0	5 0 0	10 0 0
210	10	Wokingham	10 0 0	4 0 0	10 0 0
12	500	Woodbridge	500 0 0	5 0 0	
600	2½	Woodstock	2 10 0		2 15 0
		Wooler			
		Wotton-un.-Edge			
2900	10	*Worcester*	10 0 0	8 0 0	14 5 0
		Workington			
		Worksop& Radford			
200	10	Wirksworth	10 0 0	5 0 0	10 0 0
		Worthing.....			
		Wrexham			
1800	10	Woolwich Equitbl.	10 0 0	5 0 0	10 2 6
		Woolwich Consms.			
		Woolwich (North)			
		Wymondham.....			
795	20	Yarmouth	20 0 0	5 0 0	17 to 18
		Yeadon,near Leeds			
140	30	Yeovil	30 0 0	5 0 0	30 0 0
	5	*York Untd.*£35,000	5 0 0	6 0 0	7 10 0
		SCOTLAND.			
13,000	5	Aberdeen	3 11 0	7 0 0	4 11 6
420	10	Airdrie	10 0 0	7 10 0	12 10 0
		Alloa			
		Annan			
1300	1	Anstruther.....	1 0 0	7 10 0	1 2 0
100	20	Ardrossan	20 0 0	4 0 0	20 0 0
550	20	Arbroath	20 0 0	7 10 0	30 0 0
381	5	Auchterarder.....	5 0 0	7 10 0	7 0 0
750	2	Auchtermuchty	2 0 0	6 0 0	2 10 0
2666	5	Ayr, old	5 0 0	6 0 0	6 0 0
2500	2	Ditto, new.....	2 0 0	6 0 0	2 0 0
250	10	Banff.....	10 0 0	9 10 0	10 12 6
		Barrhead			
		Bathgate.....			
		Beith.....			
1000	1	Bervie	1 0 0		1 0 0

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
		Biggar			
739	5	Blairgowrie	5 0 0	8 0 0	7 0 0
400	6	Borrowstowness	6 0 0	5 0 0	8 0 0
540	5	Brechin	5 0 0	8 10 0	9 0 0
		Bridge of Allan			
2250	2	Broughty Ferry	2 0 0	6 0 0	2 2 0
		Burntisland			
		Campbelton			
		Carluke (Lanark)			
		Clackmannan			
1333	3	Coatbridge	3 0 0	10 0 0	4 0 0
		Coldstream			
		Collinsburgh			
		Comrie			
2744	1	Crieff	1 0 0		1 0 0
		Crail, Fife			
600	1	Cullen	1 0 0	5 0 0	15 0
		Cumbernauld			
200	6	Cumnock	6 0 0	5 0 0	6 0 0
600	5	Cupar Angus	5 0 0	7 0 0	7 3 0
250	10	Cupar Fife	10 0 0	7 10 0	15 0 0
		Dalkeith			
750	2	Denny			
		Dingwall			
		Dornoch			
500	1	Douglas	1 0 0	6 0 0	1 1 0
		Dufftown			
		Dumbarton			
400	70	Dumfries	70 0 0	5 0 0	70 0 0
		Dunbar			
560	2½	Dunblane	2 10 0	4 0 0	2 10 0
	23½	*Dundee*, old £29,687	23 15 0	8 8 0	30 [illegible] 0
8000	5	*Dundee, new*	5 0 0	4 0 0	3 17 6
860	10	Dunfermline	10 0 0	7 10 0	15 0 0
		Dunkeld			
1000	2	Dunoon	2 0 0		2 0 0
		Dunse			
250	5	Dysart	5 0 0	7 10 0	6 0 0
6000	25	*Edinburgh Gas Co.*	25 0 0	10 0 0	52 0 0
5480	25	,, *and Leith Co.*	25 0 0	10 0 0	53 0 0
		Elie			
455	11½	Elgin	11 10 0	6 0 0	11 10 0
		Falkirk, old			
		,, new			
		Falkland			
		Ferry Port on Craig			
600	1	Fochabers	1 0 0		1 0 0
1440	5	Forfar	5 0 0	7 10 0	7 10 0
		Fort William			
2000	16s.	Fraserburgh	16 0	5 0 0	16 0
500	5	Galashiels	5 0 0	10 0 0	9 10 0
		Garlieston			
		Gatehouse n. Fleet			
200	2½	Girvan	2 10 0	6 0 0	2 10 0
6000	25	*Glasgow*	25 0 0	10 0 0	52 10 0
15000	10	*Glasg. City & Suburb.*	10 0 0	10 0 0	20 10 0
		Grangemouth			
		Grahamston			
	8½	Haddington	8 10 0	7 10 0	12 10 0
1600	5	*Hamilton*	5 0 0	10 0 0	6 10 0
440	5	Hawick	5 0 0	7 10 0	7 10 0
300	5	Helensburgh	5 0 0	7 10 0	7 10 0
1312	1	Huntly	1 0 0	7 10 0	1 1 0
250	5	Inverary	5 0 0	10 0 0	6 12 6
425	1	Inverkeithing	1 0 0	5 0 0	1 0 0

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
1200	10	*Invern. Gas & Water*	10 0 0	7 0 0	14 0 0
2400	5	,, new shares	1 5 0	7 0 0	2 0 0
310	10	Irvine	10 0 0	10 0 0	15 0 0
		Jedburgh			
		Johnstone (Paisley)			
		Keith			
		Kelso		10 0 0	
		Kilmarnock			
339	5	Kincardine	5 0 0	2 10 0	4 5 6
		Kinghorn			
		Kingskettle, Fife			
		Kinross			
120	5	Kirkaldy	5 0 0	10 0 0	8 10 0
320	5	Kirkcudbright	5 0 0	5 0 0	5 0 0
1000	3	Kirkintulloch, near	3 0 0	5 0 0	3 0 0
227	5	Kirkwall... [Glasg.	5 0 0	5 0 0	4 10 0
518	5	Kirriemuir	5 0 0	6 0 0	
		Lanark			
		Largo, near Leven			
280	5	Largs	5 0 0	7 10 0	7 to 8
		Lasswade, n. Edin.			
177	5	Lauder	5 0 0	5 0 0	5 0 0
		Leith			
1879	1	Leslie, Fife	1 0 0	7 10 0	1 8 0
614	1	Lesmahago	1 0 0	6 0 0	1 0 0
1500	1	Leven	1 0 0	5 0 0	1 2 0
100	10	Linlithgow	10 0 0	7 10 0	15 0 0
		Linton, n. Nobleh.			
		Lochee, n. Dundee			
240	5	Lochgilphead	5 0 0	7 10 0	5 5 0
		Lochwinnock, near			
1200	1	Markinch. [Paisley	1 0 0	7 10 0	1 5 0
282	3	Mauchline [Dumf.	3 0 0	5 0 0	3 0 0
		Maxwell-town, n.			
423	5	Maybole, Ayrshire	5 0 0	4 10 0	5 0 0
		Maryhill, n. Glasg.			
373	2	Melrose	2 0 0	7 10 0	2 8 0
718	2	Mid & East Calder	2 0 0		2 0 0
200	5	Moffat	5 0 0	5 0 0	5 0 0
400	20	Montrose	30 0 0	10 0 0	35 0 0
		Musselburgh			
618	1	Nairn	1 0 0	5 0 0	1 0 0
		Neilston, n. Glasg.			
1056	1	Newmills, near Kilmarnock	1 0 0	5 0 0	1 0 0
		Newburgh, Fife			
		Newton-on-Ayre			
107	14½	Newton Stewart	14 10 0	5 0 0	14 10 0
		North Berwick, N B			
		North Queensferry			
245	5	Oban	5 0 0	7 10 0	5 0 0
194	5	Peebles	5 0 0	5 0 0	5 0 0
800	25	Perth	25 0 0	4 16 0	22 10 0
	5	,, new	5 0 0	2 10 0	4 5 6
		Peterhead			
		Pittenweem			
2416	1	Pollokshaws, n Glsg	1 0 0	7 10 0	1 5 0
		Port Glasgow			
		Portobello, n. Edin.			
200	5	Prestonpans	5 0 0	6 0 0	5 0 0
1500	1½	Rutherglen, nGlasg	1 6 8	5 0 0	1 6 8
		Renfrew, n. Paisley			
		Saltcoats			
951	1	Sanquhar	1 0 0	5 0 0	1 0 0
		Selkirk			

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
		South Queensferry			
448	12	St. Andrew's	12 0 0	6 0 0	14 0 0
200	8	Stewarton	8 0 0	5 0 0	8 0 0
7330	2	Stirling	2 0 0	8 0 0	3 0 0
2500	1	Stonehaven	1 0 0	6 5 0	1 6 0
		Stonhouse, Lanrks.			
600	2½	Stornoway	2 10 0		2 15 0
420	5	Stranraer	5 0 0	7 10 0	5 to 5½
604	2	Strathaven, near	2 0 0	8 0 0	2 15 0
643	2½	Thurso... [Hamltn	2 10 0	4 0 0	2 10 0
		Tillicoultry, n. Alloa			
800	1	Tranent	1 0 0	5 0 0	1 0 0
		Troon			
		Wick			
		Wigton [Haven			
2051	1	Wemyss and Buck-	1 0 0	6 0 0	1 2 0

IRELAND.

		Ardee			
300	10	Armagh	10 0 0	10 0 0	20 0 0
		Ballinasloe			
		Bangor (co. Down)			
700	80	*Belfast*	80 0 0	10 0 0	100 0 0
	20	,, new	20 0 0	10 0 0	25 0 0
51	5	Ballymena	5 0 0	10 0 0	
		Ballymoney			
150	5	Ballynahinch	5 0 0		5 0 0
		Castlebaney			
		Carrickfergus			
1100	5	Carlow	5 0 0		4 10 0
400	5	Cavan	5 0 0		5 0 0
		Cookstown			
1300	5	Clonmel Consumrs	5 0 0	5 0 0	5 0 0
		Drogheda			
19,000	10	*Dublin Consumers*	6 0 0	7 0 0	8 10 0
160	25	Dundalk [(see U.G.	25 0 0	5 0 0	25 0 0
300	10	Dungannon	10 0 0	7 10 0	12 10 0
871	5	*Downpatrick*	5 0 0	4 0 0	0 0
		Enniskillen			
		Enniscorthy			
240	25	Galway	25 0 0	10 0	37 10 0
		Keady			
400	10	Kilkenny	10 0 0	8 0 0	11 5 0
		Killarney			
		Larne			
1725	5	Limerick Consum.	5 0 0		
		Lismore			
600	15	Londonderry	15 0 0	6 13 4	21 0 0
		Louth			
500	7	Lisburn	7 0 0	7 10 0	8 5 0
520	10	Lurgan	6 0 0	6 0 0	6 0 0
		Mallow			
		Monaghan			
		Nenagh			
448	5	Newtownards	5 0 0	6 0 0	6 15 0
		Newtownlimavady			
750	20	Newry	20 0 0	5 0 0	20 0 0
425	5	Omagh	5 0 0	10 0 0	6 0 0
125	20	Portadown	20 0 0	5 0 0	20 0 0
		Portaferry			
900	10	Sligo	10 0 0	6 0 0	10 0 0
		Tralee			
		United Gen. (Cork, Dublin, Limerick)			
		Waterford			

The Gas Works in the undermentioned towns belong to private individuals:—

Abergavenny.	Chester (Roodee).	Fermoy.	Kelvedon	Oswestry.	Seaham Harbour.	Waltham Abbey.
Barnet.	Chertsey.	Goole.	Leiston (Suffolk).	Parsonstown.	Sheerness.	Ware. (2 works)
Blaydon, n. Newcastle.	Crewkerne.	Harleston.	Lynn.	Peterborough.	Sidmouth.	Wem.
Bridgenorth.	Dartmouth.	Hertford.	New Ross.	Pontypool.	Sittingbourne.	Wexford.
Brompton & Gillingham	Eltham.	Holt.	Northfleet.	Rye.	Spalding.	Whitchurch (Salop).
Bungay.	Ely.	Hunmanby.	Newport I. W. (new).	Sandwich.	Tipperary.	Wisbeach.
Carnarvon.	Farsley.					

The Gas Works belong to the Corporations, or to Commissioners acting under special acts of Parliament, in the following towns:—

Athlone	Cashel.	Haverfordwest.	Lytham (Lanc.)	Richmond (Yorkshire).	Southport	Trim (Meath).
Beverley.	Coleraine.	Keighly.	Manchester.	Rochdale.	Stockport	Walsall.
Blackpool.	Doncaster.	Kells (Meath)	Milton (Kent).	Rothesay.	Strabane.	Wells (Norfolk).
Burnley	Great Malvern.	Knaresborough.	Oldham.	Salford.	Teignmouth.	Youghall.
Carlisle.	Greenock.	Leek.	Paisley.			

Price Current.

CASTINGS, per Ton.

Average Weight of Cast Iron Gas Pipes, per Yard.

1½ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow	Newcastle.	Wales.	Yorksh., Derbysh., and Staffrdsh
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	4 5 0	3 15 0	4 0 0	4 10 0	4 0 0
1¼ and 2 inches Socket Pipes	8 0 0	7 5 0	7 10 0	7 15 0	7 10 0
2½ and 3 do. do.	7 10 0	7 0 0	7 5 6	7 10 0	7 5 0
4 and 5 do. do.	7 10 0	6 15 0	7 0 0	7 5 0	7 0 0
6 inches and upwards do.	7 5 0	6 10 0	6 10 0	7 0 0	6 10 0
Retorts, 1st fusion, hot blast	7 0 0	...	7 0 0	7 5 0	7 0 0
Do. 2nd fusion, cold blast	8 0 0	...	7 5 0	7 10 0	7 5 0
Tank Plates, ⅜ thick and above	7 10 0	6 15 0	7 0 0	7 5 0	7 0 0

COALS.

NEWCASTLE.	s. d.		SCOTCH CANNEL.	per ton.
Unscreened	7 0	per ton.	Boghead ..... at Leith	28 0 ,,
Whitwell Primrose	7 6	,,	Kirkness ..... best	23 0 ,,
Pelton and Medomsley	7 9	,,	Capeldrae, first quality	20 0 ,,
Pelaw			Ditto, second quality	12 6 ,,
Burnhope, Eighton Moor, New Pelton, Peareth, South Pelaw, Washington Hutton, and South Peareth [nel.]	8 0	,,	Lesmahago at Glasgow	25 0 ,,
			Ditto at Leith	27 6 ,,
			Arniston	22 0 ,,
Ramsay's Newcastle Can-	14 0	,,	Wemyss	20 0 ,,
			Knightswood	18 0 ,,
			Methill	13 0 ,,

SUNDRIES.

Best Newcastle fire-bricks, 60s. per 1000	Welch bar iron in London ..... £9. per ton.
Ditto ditto clay ...12s. per ton.	Foreign spelter .....£23. 17s. 6d. ,,
Cliff's fire-bricks at Wortley, 57s 6d p 1000	English block tin .....£133 ,,
Tough cake copper..... £126 per ton.	Banca ditto ..... 138 ,,
English pig lead ..... £25 ,,	Tarred rope yarn, 18s. per cwt.

WROUGHT IRON TUBING, subject to 35 per cent. Discount.

	2 inches.	1½ inch.	1¼ inch.	1 inch.	¾ inch.	½ inch.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent welded tubes, from 2 to 12 feet, per foot	1 8	1 0	0 10	0 7	0 5	0 4½
Ditto ..... ,, 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting pieces, or long screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, springs, and elbows, wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron cocks	17 6	9 6	7 6	4 6	3 3	2 6
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing sockets, caps, plugs, and nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 0	

FREIGHTS, per Ton.

Coastwise—Newcastle.		*Foreign.*	
Chatham & Roches.	6s. 9d	Boulogne	8s. 6d
Cork	10 0	Barcelona	32 0
Dover	7 0	Bordeaux	17 6
Dublin	10 0	Cadiz	19 0
Exeter Quay	9 0	Calais	8 6
Folkestone	7 0	Dieppe	10 0
Hastings	8 6	Genoa	34 0
London	6 9	Hamburg	9 9
Lowestoft & Yarmth	4 9	Havre	10 6
Lynn	6 0	Leghorn	22 0
Portsmouth	9 0	Lisbon	18 0
Plymouth	9 0	Rotterdam	8 9
Whitstable	6 6	Stettin	14 6
Weymouth	8 6	Trieste and Venice	29 0

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WHITWELL PRIMROSE GAS

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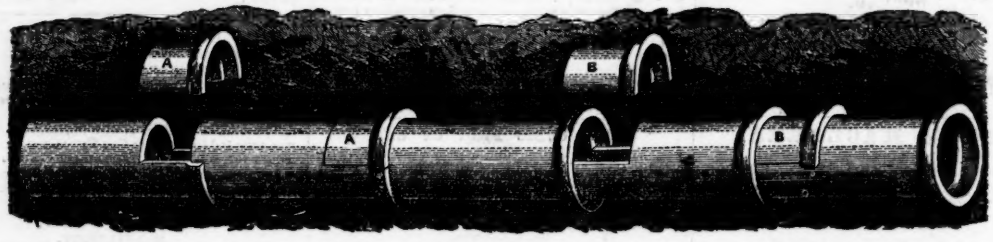

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